November 5, 2002

File 348:EUROPEAN PATENTS 1978-2002/Oct W04
(c) 2002 European Patent Office
File 349:PCT FULLTEXT 1979-2002/UB=20021031,UT=20021024
(c) 2002 WIPO/Univentio

Set	Items	Description
S1	886	PHASE(2N)CONJUGAT?
S2	956872	PROBE? OR PROBING OR INTERROGAT? OR EXPLOR? OR INVESTIGAT? OR INSPECT? OR PENETRAT? OR PROD?
S3	207722	BEAM? OR LASER? OR LIGHT(2N)(PULS? OR MODULAT?) OR MASER? - OR QUANTUM(2N)ELECTRONIC? OR OPTICAL(2N)(PUMP? OR GENERAT? OR MODULAT? OR OSCILLATOR?) OR IRASER? OR QUANTUM()GENERATOR?
S4	1742	INTRACAVIT? OR INTRA()CAVIT?
S5	112	S1(S)S2(S)S3
S6	2	S5 AND IC=H04B-010/00
S7	2	S5(S)S4
S8	1	S7 NOT S6
S9	22229	S2(3N)S3
S10	73	S9(S)S1
S11	34	S10/TI,AB,CM
S12	32	S11 NOT (S8 OR S6)

6/5,K/1 **(Item 1 from file: 348)**
DIALOG(R)File 348:EUROPEAN PATENTS

00279250
SYSTEM AND METHOD FOR ENCODING INFORMATION ONTO AN OPTICAL BEAM.
VORRICHTUNG UND VERFAHREN ZUR INFORMATIONSKODIERUNG EINES OPTISCHEN STRAHLES.
SYSTEME ET PROCEDE SERVANT A CODER DES INFORMATIONS SUR UN FAISCEAU OPTIQUE.
PATENT ASSIGNEE:
Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066, Los Angeles, California 90045-0066, (US), (applicant designated states: BE;CH;DE;FR;GB;IT;LI;NL;SE)
INVENTOR:
PEPPER, David, M., 3925 Latigo Canyon Road, Malibu, CA 90265, (US)
LEGAL REPRESENTATIVE:
KUHNEN, WACKER & PARTNER (100051), Alois-Steinecker-Strasse 22 Postfach 1553, W-8050 Freising, (DE)
PATENT (CC, No, Kind, Date): EP 262177 A1 880406 (Basic)
EP 262177 B1 920930
WO 8705715 870924
APPLICATION (CC, No, Date): EP 87901866 870212; WO 87US292 870212
PRIORITY (CC, No, Date): US 842344 860321
DESIGNATED STATES: BE; CH; DE; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G02F-001/35; **H04B-010/00** ; G02F-001/03
CITED PATENTS (WO A): GB 2135050 A
CITED REFERENCES (EP A):
See also references of WO8705715;
CITED REFERENCES (WO A):
R.A. FISHER: "Optical Phase Conjugation", 1983, Academic Press, (New York, US), chapter II: Optical Phase Conjugation in Photorefractive Materials", pages 417-443, see chapter II, III
IDEM
Journal of Optics, Volume 15, 1984, (Paris, FR), J.P. HUIGNARD: "Materiaux non Lineaires a Variations d'Indice Photoinduite et Applications", pages 305-313, see chapter 1.4, II and III
Applied Physics Letters, Volume 47, 1985, (Woodbury, US), M. CRONIN-GOLOMB: "Vibration Resistance, Short Coherence Length Operation, and Mode-Locked Pumping in Passive Phase Conjugate Mirrors", pages 1131-1133, see page 1131, right-hand column
Applied Optics, Volume 25, February 1986, (New York, US), J. STRAIT et al.: "Photorefractive Four Wave Mixing in GaAs using Diode Lasers Operating at 1,3mu m", pages 338-339, see the whole document
Optics Communications, Volume 53, April 1985, (Amsterdam, NL), S.I. STEPANOV et al.: "Efficient Unstationary Holographic Recording in Photorefractive Crystals under an External Alternating Electric Field", pages 292-295, see chapter 1. Introduction and 3. Discussion cited in the application
Soviet Physics Acoustics, Volume 29, No. 6, November-December 1983, (New York, US), A.A. CHABAN: "The Acoustophotorefractive Effect", pages 496-497, see the whole document
Optics Letters, Volume 10, No. 12, December 1985, (New York, US), B.T. ANDERSON et al.: "Self-Pumped Phase Conjugation in BaTiO3 at 1.06mu m", pages 627-628, see page 627, figure 1
Optics Letters, Volume 5, No. 6, June 1980, (New York, US), H.I. MANDELBERG: "Phase-Modulated Conjugate-Wave Generation in Ruby", pages 258-260, see page 258, left-hand column cited in the application
Applied Optics, Volume 24, July 1985, (New York, US), R. REINISCH et al.: "Fast Pockels Light Modulator using Guided Wave Resonance", pages 2001-2004, see page 2002, left-hand column;
NOTE:
No A-document published by EPO
LEGAL STATUS (Type, Pub Date, Kind, Text):

Application:	880406	A1	Published application (A1with Search Report ;A2without Search Report)
Examination:	880406	A1	Date of filing of request for examination: 871112
Change:	890830	A1	Representative (change)
*Assignee:	890830	A1	Applicant (transfer of rights) (change): Hughes Aircraft Company (214917) 7200 Hughes Terrace Bldg. C1, MS A-126 P.O.Box 45066 Los Angeles California 90045-0066 (US) (applicant designated states: BE;CH;DE;FR;GB;IT;LI;NL;SE)
*Assignee:	900816	A1	Applicant (transfer of rights) (change): Hughes Aircraft Company (214913) 7200 Hughes Terrace P.O. Box 45066 Los Angeles, California 90045-0066 (US) (applicant designated states: BE;CH;DE;FR;GB;IT;LI;NL;SE)
Examination:	900919	A1	Date of despatch of first examination report: 900803
Grant:	920930	B1	Granted patent
Oppn None:	930922	B1	No opposition filed

LANGUAGE (Publication,Procedural,Application): English; English; English

FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	1915
CLAIMS B	(German)	EPBBF1	2006
CLAIMS B	(French)	EPBBF1	2217
SPEC B	(English)	EPBBF1	4591
Total word count - document A			0
Total word count - document B			10729
Total word count - documents A + B			10729

...INTERNATIONAL PATENT CLASS: **H04B-010/00**

...SPECIFICATION essentially passive in the sense that it has a known response to an input optical **beam** , and in effect **produces** an output **beam** that is slaved to the input **beam** .

Since PCMs and photorefractive devices in general are of interest in this invention, it will...

...grating period; in general, however, this shift can be any fraction of the grating period.

Phase conjugation is an optical phenomenon that has attracted considerable attention in recent years. Several different ways of **producing phase conjugated beams** have been discussed in the literature, including four-wave mixing, stimulated Brillouin scattering, Raman scattering, three-wave mixing and photon echo devices. A review of various applications of optical **phase conjugation** is presented by Giuliano in Physics Today, "Applications of Optical **Phase Conjugation** ", April 1981, pages 27-35. A general review of the field is given in A. Yariv, IEEE, J. **Quantum Electronics** QE14, 650 (1978), and in "The **Laser** Handbook Vol. 4", edited by M. L. Stitch and M. Boss, Chapter 4 by the present inventor, "Non-Linear Optical **Phase Conjugation** ", pages 333-485, North Holland Publishing Co. 1985.

Basically, a **phase conjugate** mirror (PCM) **produces** a retro-reflective reflection of an incident **beam** , with the phase of the reflected **beam** reversed from that of the incident **beam** at the point of reflection. A typical PCM known in the prior art is shown...

...This is illustrated as a four-wave mixer, in which a pair of contra-directional **laser beams** 2 and 4 are directed into an optical mixing medium 6. An initializing **laser beam** E(sub(I)), equal in frequency to **beams** 2 and 4, is directed into the mixing medium from the side. As a result of the action of the various **beams** within the mixing medium, a reflected **beam** RE(sub(I))*, where R is the coefficient of reflectivity, is reflected back in a direction opposite to incident **beam** E(sub(I)). Since power is pumped into the system by **beams** 2 and 4,

the reflector may **produce** an amplification which makes R greater than 1.

In addition to being retro-reflective to...to a laser beam. In the case of a PCM, an encoded phase-conjugated output **beam** 20A will be **produced** .

The effect of the modulating signal upon the laser beam will depend upon the frequency...

...beams cross-coupled with each other, transferring energy from return beam 30 and forming a **phase conjugate** of the **probe beam** , the **phase conjugated beam** 32 emerging from the crystal along a path which is substantially retro-reflective to the original **probe beam** 20.

A carrier signal provided by alternating voltage source 8 is connected in series with...

...interferometers, ring laser gyroscopes, remote beacons, friend-or-foe identification, fiber communication links, mode-locked **phase conjugate** lasers/resonators, two-wave and four-wave mixer/modulator schemes, and many optical mathematical functions information on a desired characteristic, such as temperature. It **produces** a modulating signal that varies with the parameter being measured, and is applied to modulate ...

...as that shown in the previous figures and identified by the same reference numerals. A **laser** 42 **produces** a **beam** that is focused by lens 44 onto one end of an optical fiber 46, the remote end of which emits a **beam** that is collimated by lens 48 onto the photorefractive crystal 18. A **phase conjugate** of the input **beam** to the crystal is directed back through the lens and optical fiber system, the return...

...with the modulating signal from sensor 38. This signal can then be extracted from the **beam** at a remote location from sensor 38 by means of a one-way mirror 49 in the **beam** path and a detection unit 50.

The retro-reflective characteristic of the PCM assures that...

...which splits the beam and directs it to the two PCMs. The phase conjugate return **beams** from the two PCMs are then directed by element 62 to an output stage 64, which delivers the combined **beams** to an interferometric (heterodyne) detector 66. Detector 66 **produces** an output which indicates any frequency differences between the two returned **beams** . Thus, PCM 52 serves as a reference for the **beam** returned from modulated PCM 51, enabling the low frequency modulating signal to be extracted by...

...CLAIMS substantially higher frequency range than the frequency of field alternation, thereby encoding information onto the **phase conjugated** output **beam** (20A; 32) substantially through modulation of the photorefractive material's electro-optic effect.

17. The...

...modulating signal within the frequency regime of the field alternation, thereby encoding information onto the **phase conjugated** output **beam** (20A; 32) by modulating both the photorefractive material's ...of the first beam (22) within the crystal (18) at which a phase conjugated output **beam** (20A, 32) is **produced** thereby establishing a photorefractive grating, and

means (14, 16, 8; 21; 40; 54; 68) for...

...19; 38; 56) for modulating the alternating electric field to encode information onto the output **beam** (32; 20A) by means of the electro-optic effect in said crystal (18).

23. The...angle (A) to the fist beam (20) to produce an output beam (32) as a **phase conjugate** of the first **beam** (20), thereby providing

self-pumped conjugate reflection of the first **beam** (20).
34. The method of claim 32, wherein the electric field alternation is substantially higher...

6/5,K/2 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00844604 **Image available**
REMOTELY-INTERROGATED HIGH DATA RATE FREE SPACE LASER COMMUNICATIONS LINK
LIAISON DE TELECOMMUNICATION PAR LASER EN ESPACE LIBRE AVEC INTERROGATION A DISTANCE A UN DEBIT BINAIRE ELEVEE,
Patent Applicant/Assignee:
THE REGENTS OF THE UNIVERSITY OF CALIFORNIA, 1111 Franklin Street, Oakland, CA 94607-5200, US, US (Residence), US (Nationality)
Inventor(s):
RUGGIERO Anthony J, 1251 Murdell Lane, Livermore, CA 94550, US,
Legal Representative:
HORGAN Christopher J (agent), P.O. Box 808, L-703, Livermore, CA 94551, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200178262 A2 20011018 (WO 0178262)
Application: WO 2001US11197 20010406 (PCT/WO US0111197)
Priority Application: US 2000195730 20000407
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Main International Patent Class: **H04B-010/00**
Publication Language: English
Filing Language: English
Fulltext Availability:
Detailed Description
Claims
Fulltext Word Count: 6884

English Abstract
A system and method of remotely extracting information from a communications station by **interrogation** with a low power **beam** . Nonlinear **phase conjugation** of the low power **beam** results in a high power encoded return **beam** that automatically tracks the input **beam** and is corrected for atmospheric distortion. Intracavity nondegenerate four wave mixing is used in a broad area semiconductor **laser** in the communications station to **produce** the return **beam** .

French Abstract
Cette invention a trait a un systeme et a la technique correspondante permettant d'extraire, a distance, une information d'une station de communications par une interrogation effectuee grace a un faisceau de faible puissance. La conjonction de phase non lineaire du faisceau de faible puissance se traduit par l'existence d'un faisceau de retour code a haute puissance qui poursuit automatiquement le faisceau en entree et dont la distorsion atmospherique est corrigee. On utilise le melange non degenere a quatre ondes intracavitaire dans un laser a grande surface a semi-conducteur dans la station de communications afin de produire le faisceau de retour.

Legal Status (Type, Date, Text)
Publication 20011018 A2 Without international search report and to be republished upon receipt of that report.

November 5, 2002

Examination 20011115 Request for preliminary examination prior to end of 19th month from priority date

Main International Patent Class: **H04B-010/00**
Fulltext Availability:
Detailed Description
Claims

English Abstract
A system and method of remotely extracting information from a communications station by **interrogation** with a low power **beam** . Nonlinear **phase conjugation** of the low power **beam** results in a high power encoded return **beam** that automatically tracks the input **beam** and is corrected for atmospheric distortion. Intracavity nondegenerate four wave mixing is used in a broad area semiconductor **laser** in the communications station to **produce** the return **beam** .

Detailed Description
... as provide an automatic pointing and tracking function.

In order to produce a remotely interrogated **phase conjugate** communication link, the following sequence of events may occur as shown in Figure 2. First, the **probe** beacon 232 from a source 200 illuminates the general area of a sensor 202 having a RM-PCM 202a with a broad **beam** . The RM-PCM 202a is an optical, passive device. Second, the RM-PCM 202a generates a retroreflected **beam** 236 by self-pumped **phase conjugation** , establishing a communication link (comlink) between the source 200 and the sensor 202. Third, the data 240 to be transferred from the sensor 202 is encoded on the return **beam** 236 by modulating the **phase conjugate** reflectivity of the RM-PCM 202a. The wavefront of the incident **beam** 232 is reversed or phase organized to **produce** the retroreflected **beam** 236. Fourth, the retroreflected **beam** 236 propagates back to the source 200 substantially retracing its path, correcting wavefront distortions, and providing automatic pointing and tracking. The retroreflected **beam** 236 reaches the source 200 where a **beam** splitter 238 intercepts the retroreflected **beam** 236, the output of the **beam** splitter 238 is decoded it in a decoder 242 and the data 244 is retrieved ...

...a high signal to noise communications link to be established. Most low power nonlinear optical **phase conjugation** systems proposed for communication links are based on photorefractive effects in crystals. These methods often require mutual coherence between the signal (**probe**) **beam** and the pump **beams** and generally employ self-pumped non-collinear degenerate four-wave mixing configurations.

The angular rate...
...of the system angular resolution (AE)=X/d) to the response time of the nonlinear **phase conjugate** element. Although low power **phase conjugation** with self-pumped photorefractive crystals can be useful in many applications, it suffers from the major limitation that the power transmitted in the retroreflected **beam** will always be a very small fraction of the **probe** **beam** , a large amount of **probe** **beam** power will be needed to initiate the link, and since the response time of photorefractive...

...be limited to extremely low data and tracking rates (sub-kiloHertz (kHz)). For configurations that **phase**

conjugate the retroreflected **beam** at the **probe** transmitter,, more moderate
laser powers can be used, but multiple round trips between the **probe** beacon location and the sensor must take place to establish a solid link.

While operating...

...laser operation
a requirement for long range operation. Alternate photorefractive geometries based on mutually pumped **phase** **conjugation** can mitigate coherence requirements but can be substantially more complex and still suffer from inherent...

...station capable of receiving said interrogating beam; the communication station having a plurality of micro- **phase** **conjugators** arranged in an array.

Further aspects of the invention include a system and method comprising...

...from a transceiver;
receiving said interrogating beam at a communication station; encoding data onto a **phase** **conjugate** **beam** data and pumping the encoded **phase**
conjugate reflectivity by nondegenerate four wave mixing; and transmitting the encoded **phase** **conjugate** **beam** back to the transceiver
BRIEF DESCRIPTION OF THE DRAWINGS
The accompanying drawings, which are incorporated...

...of an
ordinary mirror;
Figure 1B discloses a schematic diagram of the operation of a **phase** **conjugate** mirror;
Figure 2 discloses a block diagram showing the establishment of a communications link using a retro-modulator **phase** **conjugate** mirror (RM-PCM);
Figure 3A illustrates an elevational view of a mobile platform transmitting an **interrogating** beacon to a ground based sensor having a broad area diode **laser** micro- **phase** **conjugator** (or actively modulated
retro-reflector);
Figure 3B is a perspective view of the sensor of...an RM
PCM based on non-degenerate four wave mixing (NDFWM) in broad area semiconductor **laser** diodes used in the system and method described herein;
Figure 5A is a perspective view of a first approach to obtain two dimensional **phase** **conjugation** in diode systems using a broad area diode
laser micro- **phase** **conjugator** having a plurality of stacked commercial
single stripe diodes;
Figure 5B is an elevational view of a second approach to obtain two dimensional **phase** **conjugation** in diode systems using a broad area diode **laser** micro- **phase** **conjugator** having a vertical cavity surface emitting **laser** (VCSEL);
Figures 5C and 5D are perspective views of a third approach to obtain two dimensional **phase** **conjugation** in diode systems using a broad
area diode **laser** micro- **phase** **conjugator** having a modification of a broadarea, distributed feedback (a-DFB) **laser** to allow the **interrogating** beacon
to access the gain stripe through an aperture in the top of the device;
Figure 5E is a perspective view of intracavity **laser** operation of the modified broad-area, distributed feedback **laser** of Figures 5C and

513;
Figure 5F is an elevational view of fourth approach to obtain two dimensional **phase conjugation** in diode systems using a broad area diode **laser** micro- **phase conjugator** having the modified broad-area, distributed feedback lasers in a substantially linear array arrangement; Figure...

...of a system and method of optical interconnection using a plurality of broad area diode **laser** micro- **phase conjugators** ; and
Figure 6B is block diagram of the system and method of optical interconnection of...

...second (sec)), remotely interrogated laser communications system (RILCS) based on nonlinear optical semiconductor laser micro- **phase conjugators** (also known herein as active retro-modulated micro- **phase - conjugators** (ARMPCs)). Broad area diode **laser** micro-phase @onjugators function as actively-modulated retroreflectors which amplify and encode an **interrogating laser beam** and return it precisely to the **beam** source. The term "broad area" will be used herein to indicate that the micro- **phase conjugators** are large aperture **phase conjugators** in a semiconductor device. An aperture may be defined as the acceptance opening or input of a **phase conjugate** system.

Therefore, the aperture which receives an incoming laser beam may be greater than the...
...an interrogating beacon 302 to a ground based sensor 304 having a semiconductor laser micro- **phase conjugator** . Data from the sensor 304 is then encoded onto the **interrogating beam** and a retroreflected or return **beam** 306 is sent back to the aerial platform 300.

Figure 3B is a perspective view...

...interrogating beacon 302 at the RM-PCM 310 having a broad area diode laser micro- **phase conjugator** . Sensor 304 further includes a radio frequency/global positioning service (RF/GPS) antenna to determine...

...transceiver 320 mounted on the aerial platform 300 and the sensor 304. In operation, diode **laser** 321 transmits a continuous wave 322 to a **probe** beacon telescope 324. The diode **laser** 321 may be a frequency stabilized single frequency 1550 nm diode **laser** used in conjunction with an erbium doped fiber amplifier (EDFA). Frequency stabilization of the diode **laser** 321 may be achieved using opto-electronic **laser** stabilization electronics. **Probe** beacon telescope 324 transmits an **interrogating beam** 302 in the general direction of the sensor 304. The sensor 304 receives the **interrogating beam** 302 through an input telescope 336 which is coupled to the RM-PCM having a broad area diode **laser** micro- **phase conjugator** 334. The broad area diode **laser** micro- **phase conjugator** 334 will receive the **interrogating beam** 334 and will return a **phase conjugate beam** encoded with data collected by the sensor head

314
to the transceiver. The **interrogating beam** 302 operating at frequency co, contains phase information regarding the atmospheric distortions and will essentially trigger the diode **laser** oscillator of the broad area diode **laser**
micro- **phase conjugator** 334 to pump the encoded **phase conjugate beam**
via intracavity nondegenerate four wave mixing (NDFWM) (which is discussed in detail below). Encoding of the **phase conjugate beam** at approximately 1 kHz to approximately 10 GHz (...approximately 10 GHz) rates is accomplished by
modulating the current to the broad area diode **laser** micro- **phase conjugator** 334. Sensor head 314 collects the data which is to be transmitted in cooperation with...

...and over again) or may be triggered by a sensor (not shown) which detects the **interrogating beam** 302. Encoded data 330 is sent from the encoder 328 to the drive current controller 338. The drive current controller 338 modulates the encoded data onto the **interrogating beam** 302 in the broad area diode **laser** micro- **phase conjugator** 334 by controlling the current to the broad area diode **laser** micro- **phase conjugator** 334. An encoded **phase conjugate beam** 306 is transmitted
back on the same path as the - **interrogating beam** 302 to the transceiver
320. The **probe** beacon telescope 324 at the transceiver 320 collects the encoded **phase conjugate beam** 306, separates it from the outgoing **interrogating beam** with a fiber optic circulator (not shown) and transmits
the signal to an optical receiver...

...kilometers to approximately
25 kilometers in remote interrogation of the broad area diode laser micro **phase conjugator** 334 from an aerial mobile platform; and approximately
100 to approximately 5000 kilometers in satellite...

...interact with two intracavity, counterpropagating
pump waves 402,404 at frequency co, will generate a **phase conjugate beam** 306 at a frequency, co, equal to 2cod-o),. **Phase conjugation** by four
wave mixing in **laser** diodes uses the intracavity **laser beams** 402,404 as
pump **beams** for the four wave mixing process. The nonlinear susceptibility involved in the four wave mixing...

...waves. Broad-area, angle-distributed feedback lasers are
device structures that are well-suited for **phase conjugation** via intracavity
four-wave mixing. Lateral grating confinement in a broad area multimode waveguide results...

...stable single longitudinal and transverse
modes. Even when the wavefront is incompletely sampled by the **phase conjugator** 334, compensation of low frequency spatial components may be sufficient for automatic pointing and tracking...

...gm) aperture. As discussed above, an aperture is the acceptance opening or input of a **phase conjugate**
system. With these intense intracavity pump **beams** , all that is needed is
an external **interrogating** signal **beam** to be injected into the cavity of the
laser diode to **produce** efficient four wave mixing. The system and method described herein may achieve approximately 20 dB or greater

gains in **phase conjugate** signals with less than approximately 10 nanoWatts (nW) of injected **probe** power.

In the disclosed system and method, two dimensional phase conjugation may be used. (Typically...

...the short direction). For high fidelity phase conjugation, the aperture of the broad area semiconductor **laser** diode 334 should resolve substantially all (or a 'substantial portion" of) the spatial components of the input wavefront of the **interrogating beam** .

('Substantial portion' may be defined as greater than 60% and ideally greater than 80%). In ...stripes indicated by 501a, 502a, 503a, and 504a) in the broad area diode laser micro- **phase conjugator** 334. The broad area diode **laser** micro- **phase conjugator** 334 utilizes aperture synthesis with a plurality of lasers to form a two dimensional array to sample the wavefront of the **interrogating beam** 302. The array may be formed a stacked single stripe devices or spaced apart to...

...In this implementation, optical pump 520 is used to insure uniform gain across a large **laser** aperture, the external VCSEL resonator may control the spatial mode of the intracavity pump **beams** 522, while an external seed **laser** 523 (or lineriarrowing element) insures single longitudinal mode operation. The second resonator may be used to amplify the **interrogating beam** 302 and the **phase conjugate beam** 306. In a VCSEL, the **interrogating beam** 302 and the **optical pump beam** are substantially parallel (and maybe collinear). The potential for high fidelity wavefront correction. using a...three devices.

Efficient optical coupling of the probe beacon into the optical semiconductor laser micro- **phase conjugators** (or ARMPC) is desired to producing **phase conjugate** transceivers with low prime power requirements. It primarily determines the amount of **laser** power required from the transceiver (or beacon) to initiate the communications link. Once the communications link is established, the **phase conjugation** process will guarantee that the coupling is optimal and alignment insensitive. The intrinsic greater than...

...in the range of approximately 30 to approximately 40 dB gain) in the ARMPCs will **produce** a retroreflector **beam** with sufficient power to close the communications link over long ranges. Absolute power of the retro- **beam** is determined by the four-wave mixing conversion efficiency and the rated output power of the broad area **laser** diode used n the device.

Optimally designed coupling optics should yield approximately 75 to 80...
...divergence and narrow optical linewidths of both the interrogating laser beacon and its precisely pointed **phase conjugate** return, coupled with burst mode operation, may make the system substantially undetectable. When operating at...of pointing and tracking systems on the interrogated end of the laser communications link. The **phase conjugating** optical semiconductor **laser** micro- **phase conjugator** described herein are constructed to adaptively point and track the **interrogating laser**

beacon.

The micro-phase conjugators may automatically seek out the intended receiver aperture within the...

Claim
... station capable of receiving said interrogating beam; and
said communication station having a plurality of **phase conjugators** arranged in an array.

2 The system of claim 1 further comprising:
said communication station...

...said communication station is configured to respond to said interrogating beam by encoding data into **phase conjugate beam** in the plurality of semiconductor **laser** diodes and
pumping the encoded **phase conjugate beam** by intracavity nondegenerate four wave mixing.

4 The system of claim 3, wherein said encoding...

...least four.

10 The system of claim 1, wherein the apertures of the plurality of **phase conjugators** are sufficient to resolve a substantial portion of the
spatial components of the input wavefront of the **interrogating beam** .

11 The system of claim 1, wherein the apertures of the plurality of **phase conjugators** are sufficient to resolve greater than approximately 80% of the spatial components of the input wavefront of the **interrogating beam** .

12 The system of claim 1, wherein the communication station does not have a movable...

...claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of **phase conjugators** ,
at a substantially transverse angle.

15 The system of claim 1, wherein the interrogating beam interacts with pump beams operating in the plurality of **phase conjugators**
in a substantially parallel manner.
16 The system of claim 1, wherein the transceiver is...

...a communication station capable of receiving said interrogating beam; and
said communication station having a **phase conjugator** with a top electrode, wherein an aperture is located in said top electrode.

19 The...

...18, wherein the interrogating beam interacts with at least one pump beam operating in the **phase conjugator**
at a substantially transverse angle.

20 The system of claim 18, wherein the phase conjugator...

...a communication station capable of receiving said interrogating

beam; and
said communication station having a **phase conjugator** which is a VCSEL.

23 The system of claim 22, wherein the interrogating beam interacts with at least one pump beam operating in the **phase conjugator** in a substantially parallel manner.

24 An optical interconnection system comprising:
a fiber optic device...

...micro-mirror adapted to receive said interrogating beam and transmit the beam to a predetermined **phase conjugator** .

25 The system of claim 24, wherein said phase conjugator is a VCSEL.

26 The...

...24, wherein said interrogating beam interacts with at least one pump beams operating in the **phase conjugator** in a substantially parallel manner'.

27 The system of claim 24, wherein said phase conjugator...
...24, wherein the interrogating beam interacts with at least one pump beam operating in the **phase conjugator** at a transverse angle.

30 The system of claim 24, wherein said predetermined phase conjugator...

...communication station operatively coupled to said transmitting means and having a means for returning a **phase conjugate beam** to said transmitting and receiving means.

35 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at a communication station;
encoding data onto a **phase conjugate beam** data and pumping the encoded **phase conjugate** reflectivity by nondegenerate four wave mixing; and
transmitting the encoded **phase conjugate beam** back to the transceiver.

36 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase conjugators** ;
modulating data onto a **phase conjugate beam** ; and
transmitting the **phase conjugate beam** to said transceiver.

37 The method of claim 36, further comprising:
collecting data through a in each of said **phase conjugators** in a substantially parallel manner.

39 The method of claim 36, wherein said interrogating beam interacts with at least on pump beam operating in each of said **phase conjugators** in a substantially transverse manner.

40 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase**

conjugators through apertures located in the top electrodes of the **phase** **conjugators** ;
modulating data onto a **phase** **conjugate** **beam** ; and
transmitting the **phase** **conjugate** **beam** to said transceiver.
41 A method comprising:
transmitting an interrogating beam from a transceiver;
receiving said interrogating beam at an array of **phase** **conjugators** and
resolving a substantial portion of the spatial components of the input wavefront of the **interrogating** **beam** ;
modulating data onto a **phase** **conjugate** **beam** ; and
transmitting the **phase** **conjugate** **beam** to said transceiver.

42 A method of providing an optical interconnect comprising:
transmitting an interrogating...

...micro-mirror across free space;
transmitting a second beam from micro-mirror to a predetermined **phase** **conjugator** .

43 The method of claim 42,
modulating data onto said second beam at said predetermined.

8/5,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00937342
Optical element for a laser
Optisches Element fur einen Laser
Element optique pour laser
PATENT ASSIGNEE:
REGENTS OF THE UNIVERSITY OF MINNESOTA, (267576), Morrill Hall, 100 Church Street S.E., Minneapolis MN 55455, (US), (applicant designated states: AT;BE;CH;DE;DK;ES;FR;GB;GR;IE;IT;LI;LU;MC;NL;PT;SE)
INVENTOR:
Leger, James R., 19000- 31st Avenue North, Plymouth, Minnesota 55455, (US)
LEGAL REPRESENTATIVE:
Beresford, Keith Denis Lewis et al (28273), BERESFORD & Co. 2-5 Warwick Court High Holborn, London WC1R 5DJ, (GB)
PATENT (CC, No, Kind, Date): EP 852415 A2 980708 (Basic)
EP 852415 A3 981111
APPLICATION (CC, No, Date): EP 98200675 950505;
PRIORITY (CC, No, Date): US 239028 940506; US 433815 950504
DESIGNATED STATES: AT; BE; CH; DE; DK; ES; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE
RELATED PARENT NUMBER(S) - PN (AN):
EP 758495 (EP 959212358)
INTERNATIONAL PATENT CLASS: H01S-003/10; H01S-003/08; G02B-005/18;

ABSTRACT EP 852415 A2
Method for making a distortion-compensating phase-adjustment element for a laser. One type of distortion to be compensated for is heat distortion. Also described is a method for making a custom phase-conjugating diffractive mirror for a laser resonator comprising the steps of: (a) choosing a specified beam mode profile a1))(x,y); (b) calculating the mode profile b(x',y') which is a value of the specified beam a1))(x,y) that is propagated to the reflection surface of the diffractive mirror and (c) calculating mirror reflectance t(x',y') which reflects phase conjugate of b(x',y') and corrects for distortions such as heat. A method for fabricating such a mirror is shown. Another aspect of the invention is the addition of a phase adjusting element into a laser resonator, and compensating for the addition of a phase adjusting element in the design of other phase-adjusting elements such as the mirrors and correcting for distortions such as heat.
ABSTRACT WORD COUNT: 149

LEGAL STATUS (Type, Pub Date, Kind, Text):

Assignee:	001108 A2	Transfer of rights to new applicant: REGENTS OF THE UNIVERSITY OF MINNESOTA (267571) 600 University Gateway, 200 Oak Street SE Minneapolis, MN 55455-2070 US
Examination:	20000209 A2	Date of dispatch of the first examination report: 19991221
Withdrawal:	020227 A2	Date application deemed withdrawn: 20010816
Application:	980708 A2	Published application (A1with Search Report ;A2without Search Report)
Search Report:	981111 A3	Separate publication of the European or International search report
Examination:	990526 A2	Date of filing of request for examination: 990326

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9828	1868
SPEC A	(English)	9828	15650
Total word count - document A			17518

Total word count - document B 0
Total word count - documents A + B 17518

...SPECIFICATION cavity length.
In conclusion, a new type of laser resonator was implemented that employs an **intra - cavity** phase plate and a diffractive mode-selecting mirror to produce large-diameter fundamental modes in...

...order modes designed to effectively insure single-spatial-mode operation.

A Laser Using Two Custom **Phase - Conjugated** Diffractive Mirrors
A diffractive laser cavity mirror is described in the discussion for Figure 2...

12/3,K/1 (Item 1 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01423685
Holographic recording and reproducing apparatus and method
Vorrichtung und Verfahren zur Aufnahme und Wiedergabe von Hologrammen
Methode et dispositif d'enregistrement et de reproduction d'hologrammes
PATENT ASSIGNEE:
Pioneer Corporation, (2812420), 4-1 Meguro 1-chome, Meguro-ku, Tokyo, (JP), (Applicant designated States: all)
INVENTOR:
Tanaka, Satoru, c/o Corporate R & D Laboratory, Pioneer Corporation, 6-1.1, Fujimi, Tsurugashima-shi, Saitama 350-2288, (JP)
LEGAL REPRESENTATIVE:
Manitz, Finsterwald & Partner GbR (100614), Postfach 31 02 20, 80102 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1202137 A2 020502 (Basic)
APPLICATION (CC, No, Date): EP 2001125863 011030;
PRIORITY (CC, No, Date): JP 2000332825 001031
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: G03H-001/04; G11C-013/04
ABSTRACT WORD COUNT: 218
NOTE:
Figure number on first page: NONE

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200218	916
SPEC A	(English)	200218	5753
Total word count - document A			6669
Total word count - document B			0
Total word count - documents A + B			6669

...ABSTRACT into the recording medium such that the signal light beam intersects with the reference light **beam** to **produce** an optical interference pattern with the reference and signal light beams within the recording medium...

...opposite direction along the optical axis of the recording reference light beam to generate a **phase conjugate** wave from a refractive-index grating of the light interference pattern; a splitting portion for splitting the **phase conjugate** wave from the optical path of the signal light beam to image a dot pattern with the **phase conjugate** wave; a photo-detecting portion for detecting the dot pattern imaged with the **phase conjugate** wave to reproduce the image data.

...CLAIMS lens and said converging lens; and
during both the irradiation of the recording reference light **beam** and the **production** of the **phase conjugate** wave, forwarding a reproduced light from the real image to said converging lens to converge...

...medium in such a manner that said reproduced light intersects with the recording reference light **beam** to **produce** an optical interference pattern of refractive index at a different portion away from said reproduction...

12/3,K/2 (Item 2 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

01420854
Hologram recording and reproducing apparatus
Vorrichtung zur Aufnahme und Wiedergabe von Hologrammen
Appareil pour l'enregistrement et la reproduction d'un hologram
PATENT ASSIGNEE:
Pioneer Corporation, (2812420), 4-1 Meguro 1-chome, Meguro-ku, Tokyo, (JP), (Applicant designated States: all)
INVENTOR:
Itoh, Yoshihisa, c/o Pioneer Corporation, Corp.Res.and Development Lab., 6-1-1,Fujimi, Tsurugashima-shi, Saitama 350-2288, (JP)
Matsushita, Hajime, c/o Pioneer Corporation, Corp.Res.and Development Lab., 6-1-1,Fujimi, Tsurugashima-shi, Saitama 350-2288, (JP)
LEGAL REPRESENTATIVE:
Manitz, Finsterwald & Partner GbR (100614), Postfach 31 02 20, 80102 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 1199614 A2 020424 (Basic)
APPLICATION (CC, No, Date): EP 2001124722 011016;
PRIORITY (CC, No, Date): JP 2000316117 001017
DESIGNATED STATES: AT; BE; CH; CY; DE; DK; ES; FI; FR; GB; GR; IE; IT; LI; LU; MC; NL; PT; SE; TR
EXTENDED DESIGNATED STATES: AL; LT; LV; MK; RO; SI
INTERNATIONAL PATENT CLASS: G03H-001/04
ABSTRACT WORD COUNT: 218
NOTE:
Figure number on first page: 2

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	200217	403
SPEC A	(English)	200217	5440
Total word count - document A			5843
Total word count - document B			0
Total word count - documents A + B			5843

...ABSTRACT into the recording medium such that the signal light beam intersects with the reference light **beam** to **produce** an optical interference pattern with the reference and signal light beams within the recording medium...

...opposite direction along the optical axis of the recording reference light beam to generate a **phase conjugation** wave from a refractive-index grating of the light interference pattern; a splitting portion for splitting the **phase conjugation** wave from the optical path of the signal light beam to image a dot pattern with the **phase conjugation** wave; a photo-detecting portion for detecting the dot pattern imaged with the **phase conjugation** wave to reproduce the image data.

12/3,K/3 (Item 3 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00935482
OPTICAL FIBER COMMUNICATION SYSTEM USING OPTICAL PHASE CONJUGATE, APPARATUS APPLICABLE TO THE SYSTEM AND ITS MANUFACTURING METHOD
FASEROPTISCHES UBERTRAGUNGSSYSTEM MIT OPTISCHER PHASENKONJUGATION, FUR DAS SYSTEEM GEEIGNETE VORRICHTUNG UND IHR HERSTELLUNGSVERFAHREN
SYSTEME DE COMMUNICATION A FIBRE OPTIQUE UTILISANT UN CONJUGUE DE LA PHASE OPTIQUE, APPAREIL APPLICABLE AU SYSTEME ET SON PROCEDE DE FABRICATION
PATENT ASSIGNEE:
FUJITSU LIMITED, (211463), 1-1, Kamikodanaka 4-chome, Nakahara-ku,

Kawasaki-shi, Kanagawa 211-8588, (JP), (applicant designated states: DE;FR;GB;IT)
INVENTOR:
WATANABE, Shigeki, Fujitsu Limited, 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211, (JP)
LEGAL REPRESENTATIVE:
von Fischern, Bernhard, Dipl.-Ing. et al (9674), Hoffmann - Eitle, Patent- und Rechtsanwalte, Arabellastrasse 4, 81925 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 862078 A1 980902 (Basic)
WO 9808138 980226
APPLICATION (CC, No, Date): EP 97935861 970822; WO 97JP2926 970822
PRIORITY (CC, No, Date): JP 96221274 960822
DESIGNATED STATES: DE; FR; GB; IT
INTERNATIONAL PATENT CLASS: G02F-001/35; H04B-010/18;
ABSTRACT WORD COUNT: 167

LANGUAGE (Publication,Procedural,Application): English; English; Japanese
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9836	4665
SPEC A	(English)	9836	20568
Total word count - document A			25233
Total word count - document B			0
Total word count - documents A + B			25233

...CLAIMS said second optical fiber and having a pass-band including the wavelength of the first **phase conjugate beam** , whereby noise **produced** by said optical amplifier is removed.
15. An optical fiber communication system according to claim...a fourth end which correspond to an input end and an output end for the **phase conjugate beam** , respectively;
the **product** of the average value of the chromatic dispersion and the length of said first optical...

12/3,K/4 (Item 4 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00905496
Ozone compatible stimulated brillouin scattering materials
Ozonvertragliche Materialien fur stimulierte Brillouin-Streuung
Materiaux compatibles avec l'ozon pour la diffusion Brillouin stimulee
PATENT ASSIGNEE:
TRW INC., (376410), One Space Park Building E2/7073, Redondo Beach, CA 90278, (US), (Applicant designated States: all)
INVENTOR:
Injeyan,Hagop (NMI), 1950 Fern Lane, Glendale, CA 91208, (US)
St.Pierre,Randall J., 3019 3rd Street No.204, Santa Monica, CA 90405, (US)
LEGAL REPRESENTATIVE:
Schmidt, Steffen J., Dipl.-Ing. (70552), Wuesthoff & Wuesthoff, Patent- und Rechtsanwalte, Schweigerstrasse 2, 81541 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 827012 A2 980304 (Basic)
EP 827012 A3 000621
APPLICATION (CC, No, Date): EP 97114375 970820;
PRIORITY (CC, No, Date): US 697649 960828
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: H01S-003/30; G02F-001/35
ABSTRACT WORD COUNT: 202
NOTE:
Figure number on first page: NONE

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	9810	377
SPEC A	(English)	9810	1879
Total word count - document A			2256
Total word count - document B			0
Total word count - documents A + B			2256

...ABSTRACT A2
A device for producing **phase conjugation** of electromagnetic radiation using stimulated Brillouin scattering (SBS), comprising an SBS cell having a liquid...

...aberrations created when the beam passes through an amplifying medium comprising the step of generating **phase conjugation** by SBS using a liquid perfluorocarbon as an SBS medium. Further, a method of **producing** an output **laser beam** comprising the steps of, generating an initial laser beam using a laser and **phase conjugating** the initial laser beam by SBS using a liquid perfluorocarbon medium as an SBS medium...

12/3,K/5 (Item 5 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00836733
Phase conjugate wave generating device, wavelength converting method, optical dispersion compensation method and multi-wavelength light generating device
Vorrichtung zur Erzeugung phasenkonjugierter Wellen, Verfahren zur Umwandlung optischer Wellenlangen, optisches Dispersionskompensationsverfahren, und Mehrfachw
Dispositif a generation d'ondes optiques a conjugaison de phase, methode de conversion de longueur d'onde, methode de compensation de dispersion optique et disp
PATENT ASSIGNEE:
FUJITSU LIMITED, (211463), 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211, (JP), (applicant designated states: DE;FR;GB)
INVENTOR:
Kuwatsuka, Haruhiko, c/o Fujitsu Limited, 1-1, Kamikodanaka 4-chome, Nakahara-ku, Kawasaki-shi, Kanagawa 211, (JP)
LEGAL REPRESENTATIVE:
Melnick, Geoffrey Lionel et al (84651), Haseltine Lake & Co., Imperial House, 15-19 Kingsway, London WC2B 6UD, (GB)
PATENT (CC, No, Kind, Date): EP 774810 A2 970521 (Basic)
EP 774810 A3 980812
APPLICATION (CC, No, Date): EP 96308248 961114;
PRIORITY (CC, No, Date): JP 95296524 951115; JP 96250710 960920
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: H01S-003/25; G02F-001/35; H04B-010/18;
ABSTRACT WORD COUNT: 127

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB97	775
SPEC A	(English)	EPAB97	5123
Total word count - document A			5898
Total word count - document B			0
Total word count - documents A + B			5898

...ABSTRACT films (22X) coated on a light input end and a light output end to transmit **phase conjugate** waves a **probe beam** light source for injecting the **probe beam** into the light input end of the distributed feedback semiconductor laser (1), a current supplying...

...semiconductor laser (1) to oscillate a pump beams and a lens system (6) for extracting **phase conjugate** wave which is output from the light output end of the distributed feedback semiconductor laser (1) by injecting the **probe beam** into the distributed feedback semiconductor laser (1) which is oscillating the pump beam.

...CLAIMS feedback semiconductor laser (1) to oscillate a pump beam; and means (8) for detecting said **phase conjugate** waves output from said optical output end of said distributed feedback semiconductor laser (1) by injecting said **probe beam** into said distributed feedback semiconductor laser (1) which is for oscillating said pump beam.
2...

...end of said distributed feedback semiconductor laser (1), whilst in an oscillation state,with a **probe beam** , so as to emit **phase conjugate** wave light from said optical output end.
7. An optical dispersion compensating method comprising the...

...fiber (2) into said optical input end of said distributed feedback semiconductor laser; and
outputting **phase conjugate** wave light, which is output from said distributed feedback semiconductor laser (1) by inputting said **probe beam** , from a second optical fiber (4) having a length identical to that of said first optical fiber (1) after said **probe beam** has been restored to its original waveform by compensating said dispersion by being passed through...

12/3,K/6 (Item 6 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00818698
Variable coherence length high brightness laser architecture
Hochintensitatslaserarchitektur mit variabler Koharenzlange
Architecture de laser a haute intensite a longueur de coherence variable
PATENT ASSIGNEE:
TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach, California 90278, (US), (applicant designated states: DE;FR;GB)
INVENTOR:
Injeyan, Hagop, 1950 Fern Lane, Glendale, California 91208, (US)
Lembo, Lawrence J., 5330 W. 190th Street,# 141, Torrance, California 90503, (US)
St.Pierre, Randall J., 3019 Third Street, Unit 204, Santa Monica, California 90405, (US)
Valley, Marcy M., 2827 Wigtown Road, Los Angeles, California 90064, (US)
LEGAL REPRESENTATIVE:
Schmidt, Steffen J., Dipl.-Ing. (70552), Wuesthoff & Wuesthoff, Patent- und Rechtsanwalte, Schweigerstrasse 2, 81541 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 762578 A2 970312 (Basic)
EP 762578 A3 980128
APPLICATION (CC, No, Date): EP 96111773 960722;
PRIORITY (CC, No, Date): US 520349 950828
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/10; H01S-003/00;
ABSTRACT WORD COUNT: 182

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB97	524
SPEC A	(English)	EPAB97	2394
Total word count - document A			2918
Total word count - document B			0

Total word count - documents A + B 2918

...ABSTRACT a resonant electro-optical modulator and a source of radio-frequency (rf) modulation voltage, to **produce** a modulator output **beam** having sidebands spaced on each side of the nominal frequency of the single-mode laser...

...modulator. In another embodiment of the invention, the modulator is installed in a PC MOPA (**phase conjugated** master oscillator power amplifier) configuration to provide modulation only on the return path of the beam from a **phase conjugation** device having a stimulated Brillouin scattering (SBS) medium. Because the electro-optical modulator is sensitive...

12/3,K/7 (Item 7 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00684401
Birefrigence-compensated alignment-insensitive frequency doubler
Ausrichtungsunempfindlicher Frequenzverdoppler mit Doppelbrechnungskompensation
Doubleur de frequence insensible a l'alignement avec compensation de birefringence
PATENT ASSIGNEE:
TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach, California 90278, (US), (applicant designated states: DE;FR;GB)
INVENTOR:
Heflinger, Lee O., 5001 Paseo de Pablo, Torrance, California 90505, (US)
Simmons, William W., 4181 Maritime Road, Rancho Palos Verdes, California 90274, (US)
St. Pierre, Randall J., 928 Sixth Street, Apt. 2, Santa Monica, California 90403, (US)
Injeyan, Hagop (NMI), 1950 Fern Lane, Glendale, California 91208, (US)
LEGAL REPRESENTATIVE:
Schmidt, Steffen J., Dipl.-Ing. et al (70552), Wuesthoff & Wuesthoff, Patent- und Rechtsanwalte, Schweigerstrasse 2, 81541 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 654876 A1 950524 (Basic)
EP 654876 B1 981111
APPLICATION (CC, No, Date): EP 94114220 940909;
PRIORITY (CC, No, Date): US 152647 931112
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: H01S-003/109; G02F-001/37;
ABSTRACT WORD COUNT: 151

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9846	940
CLAIMS B	(German)	9846	823
CLAIMS B	(French)	9846	1056
SPEC B	(English)	9846	2309
Total word count - document A			0
Total word count - document B			5128
Total word count - documents A + B			5128

...CLAIMS beam from the master oscillator to said first Type II frequency doubler crystal (10) to **produce** an output **beam** having a second harmonic frequency component and a residual fundamental frequency component;
- then passing the...
...crystal;
- amplifying the input beam from the frequency doubler;
- reflecting the amplified input beam in **phase conjugated** form

from a **phase conjugate** cell (34);
- cancelling substantially all aberrations introduced into the input beam in the frequency doubler...

12/3,K/8 (Item 8 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00681865
High brightness solid-state laser with zig-zag amplifier
Festkorperlaser hoher Helligkeit mit Zickzack-Verstarker
Laser a materiau solide a haute brillance avec amplificateur a zig-zag
PATENT ASSIGNEE:
TRW INC., (376412), One Space Park, Bldg. E1/4021, Redondo Beach, California 90278, (US), (applicant designated states: DE;FR;GB)
INVENTOR:
Injeyan, Hagop (NMI), 1950 Fern Lane, Glendale, California 91208, (US)
St. Pierre, Randall J., 928 Sixth Street, Apt. 2, Santa Monica, California 90403, (US)
Hilyard, Rodger C., 16831 Laveda, Canyon Country, California 91351-1724, (US)
Harpole, George M., 812 Eastman Place, San Pedro, California 90731, (US)
Hoefer, Carolyn S., 2712 Foose Road, Malibu, California 90265, (US)
LEGAL REPRESENTATIVE:
Schmidt, Steffen J., Dipl.-Ing. et al (70552), Wuesthoff & Wuesthoff, Patent- und Rechtsanwalte, Schweigerstrasse 2, 81541 Munchen, (DE)
PATENT (CC, No, Kind, Date): EP 652616 A1 950510 (Basic)
EP 652616 B1 981111
APPLICATION (CC, No, Date): EP 94114221 940909;
PRIORITY (CC, No, Date): US 148758 931105
DESIGNATED STATES: DE; FR; GB
INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/042; H01S-003/06; H01S-003/094; H01S-003/0941;
ABSTRACT WORD COUNT: 256

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	9846	1293
CLAIMS B	(German)	9846	1185
CLAIMS B	(French)	9846	1522
SPEC B	(English)	9846	3759
Total word count - document A			0
Total word count - document B			7759
Total word count - documents A + B			7759

...ABSTRACT A1
A solid-state **laser** architecture **producing** a **beam** of extremely high quality and brightness, including a master oscillator (10) operating in conjunction with a zig-zag amplifier (16,30), an image relaying telescope (17) and a **phase conjugation** cell (20). One embodiment of the laser architecture compensates for birefringence that is thermally induced in the amplifier (16), but injects linearly polarized light into the **phase conjugation** cell (20). Another embodiment (19) injects circularly polarized light into the **phase conjugation** cell (20) and includes optical components that eliminate birefringence effects arising in a first pass...

12/3,K/9 (Item 9 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00669907

Polarization-insensitive optical four-photon mixer.
Polarisationsunempfindlicher Vierwellenmischer.
Melangeur de quatre ondes independent de la polarisation.
PATENT ASSIGNEE:
AT&T Corp., (589370), 32 Avenue of the Americas, New York, NY 10013-2412, (US), (applicant designated states: DE;DK;ES;FR;GB;GR;IT)
SIEMENS AKTIENGESELLSCHAFT, (200520), Wittelsbacherplatz 2, D-80333 Munchen, (DE), (applicant designated states: DE;DK;ES;FR;GB;GR;IT)
INVENTOR:
Kurtzke, Christian, 113 Hazlet Avenue, Hazlet, New Jersey 07730, (US)
Wiesenfeld, Jay M., 15 Oak Street, Lincroft, New Jersey 07738, (US)
LEGAL REPRESENTATIVE:
Watts, Christopher Malcolm Kelway, Dr. et al (37391), AT&T (UK) Ltd. 5, Mornington Road, Woodford Green Essex, IG8 0TU, (GB)
PATENT (CC, No, Kind, Date): EP 643320 A2 950315 (Basic)
EP 643320 A3 960228
APPLICATION (CC, No, Date): EP 94306420 940831;
PRIORITY (CC, No, Date): US 120013 930910
DESIGNATED STATES: DE; DK; ES; FR; GB; GR; IT
INTERNATIONAL PATENT CLASS: G02F-001/35; H04B-010/18;
ABSTRACT WORD COUNT: 125

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPAB95	1391
SPEC A	(English)	EPAB95	5316
Total word count - document A			6707
Total word count - document B			0
Total word count - documents A + B			6707

...CLAIMS a combined signal;
said nonlinear mixing device adapted to receive said combined signal from said **beam** combiner and to **produce** said mixing products of said pump signal and said one of said components of said optical signal, one of said mixing products representing a **phase conjugate** of said one of said components of said optical signal.
9. The optical mixer of...

12/3,K/10 (Item 10 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00460176
Optical phase conjugation apparatus including light pipe for multiple beam combination.
Vorrichtung zur optischen Phasenkonjugation mit Lichtleitkorper zur Uberlagerung mehrerer Strahlen.
Dispositif de conjugaison de phase optique avec guide de lumiere pour combinaison de plusieurs rayons lumineux.
PATENT ASSIGNEE:
HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA 90045-0066, (US), (applicant designated states: BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)
INVENTOR:
Stephens, Ronald R., 3117 W. Sierra Drive, Westlake Village, California 91362, (US)
LEGAL REPRESENTATIVE:
Witte, Alexander, Dr.-Ing. (46523), Witte, Weller, Gahlert & Otten Patentanwalte Augustenstrasse 14, W-7000 Stuttgart 1, (DE)
PATENT (CC, No, Kind, Date): EP 452838 A1 911023 (Basic)
APPLICATION (CC, No, Date): EP 91105936 910413;
PRIORITY (CC, No, Date): US 511665 900420
DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE

INTERNATIONAL PATENT CLASS: G02F-001/35; G02B-027/10;
ABSTRACT WORD COUNT: 154

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	1521
SPEC A	(English)	EPABF1	4583
Total word count - document A			6104
Total word count - document B			0
Total word count - documents A + B			6104

...CLAIMS pipe (38; 64; 100) such that they are subtantially parallel to each other.

17. A **phase conjugate** , master oscillator-power amplifier apparatus having light source means (54) for producing a single coherent light beam (56), having beam splitting means (58; 76; 84) for splitting the single light **beam** (56) to **produce** a plurality of input light beams (56a-56c) and having power amplifier means (60; 90) for amplifying the input light beams (56a-56c), characterized by **phase conjugate** mirror means (68) for **phase conjugating** the input light beams (56a-56c) which emerge from the power amplifier means (60; 90) and reflecting the **phase conjugated** light beams back through the power amplifier means (60; 90), wherein further:
- optical light pipe...

...and
- second optical means (66) are disposed between the light pipe means (64) and the **phase conjugate** mirror means (68) for focussing said combined light beams emerging from the second end of the light pipe means (64) into the **phase conjugate** mirror means (68) at a predetermined position therein and with a predetermined beam diameter.

18...

12/3,K/11 (Item 11 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00423262
Master oscillator power amplifier with interference isolated oscillator.
Hauptoszillator-Leistungsverstarker mit durch Interferenz isoliertem Oszillator.
Amplificateur de puissance a oscillateur principal avec oscillateur isole par interference.
PATENT ASSIGNEE:
HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA 90045-0066, (US), (applicant designated states: DE;FR;GB;IT)
INVENTOR:
O'Meara, Thomas R., 5961 Floris Heights, Malibu, CA 90265, (US)
LEGAL REPRESENTATIVE:
Kuhnen, Wacker & Partner (100051), Schneggstrasse 3-5 Postfach 1553, W-8050 Freising, (DE)
PATENT (CC, No, Kind, Date): EP 428923 A2 910529 (Basic)
EP 428923 A3 920325
APPLICATION (CC, No, Date): EP 90121015 901102;
PRIORITY (CC, No, Date): US 439212 891120
DESIGNATED STATES: DE; FR; GB; IT
INTERNATIONAL PATENT CLASS: H01S-003/23;
ABSTRACT WORD COUNT: 171

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:
Available Text Language Update Word Count

CLAIMS A	(English)	EPABF1	2325
SPEC A	(English)	EPABF1	2952
Total word count - document A			5277
Total word count - document B			0
Total word count - documents A + B			5277

...CLAIMS at the MO wavelength, whereby said first and second beam components interact at the second **beam** splitter to **produce** a constructive interference output beam,

an optical amplifier positioned in the path of said constructive interference output beam to amplify said beam in a first amplifying pass,

a **phase conjugate** mirror (PCM) positioned to receive the amplified beam and to direct a **phase conjugate** of the amplified beam back to said amplifier for a second amplifying pass, said **phase conjugate** beam being shifted from the input beam by a predetermined frequency shift and being directed from said amplifier back to said second beam splitter, said second beam splitter splitting the **phase conjugate** beam into first and second components directed by said beam directing means back to said at the **phase conjugate** beam wavelength, whereby said **phase conjugate** beam components undergo destructive interference at said first beam splitter back along said input path towards the MO, and constructive interference to **produce** an output **beam** along an output path which does not enter the MO.

16. The MOPA of claim...

...at the beam wavelength, whereby said first and second beam components interact at the second **beam** splitter to **produce** a constructive interference output beam,

an optical amplifier positioned in the path of said constructive interference output beam to amplify said beam in a first amplifying pass,

a **phase conjugate** mirror (PCM) positioned to receive the amplified beam and to direct a **phase conjugate** of the amplified beam back to said amplifier for a second am plifying pass, said **phase conjugate** beam being shifted from the input beam by a predetermined frequency shift and being directed from said amplifier back to said second beam splitter, said second beam splitter splitting the **phase conjugate** beam into first and second components directed by said beam directing means back to said...

...paths differing in effective length by approximately an odd number of half-wavelengths at the **phase conjugate** beam wavelength, whereby said **phase conjugate** beam components undergo destructive interference at said first beam splitter back along said input path and constructive interference to **produce** an output **beam** along an output path which differs from said input path.

27. The power amplifier of...

12/3,K/12 (Item 12 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

00421034

Self-pumped, optical phase conjugation **method and apparatus using pseudo-conjugator to** produce **retroreflected seed** beam .

Verfahren mit sich selbstpumpender optischer Phasenkonjugation und Vorrichtung zur Erzeugung eines retroreflektierten Kernstrahls mittels Pseudokonjugator.

Methode de conjugaison de phase optique a auto-pompage et appareil pour produire un germe lumineux retroreflechi utilisant un pseudo-conjugueur.

PATENT ASSIGNEE:

HUGHES AIRCRAFT COMPANY, (214919), 7200 Hughes Terrace, Los Angeles, CA 90045-0066, (US), (applicant designated states: DE;ES;FR;GB;IT;NL)
INVENTOR:
Pepper, David M., 3925 Latigo Canyon Road, Malibu, California 90265, (US)
Mullen, Ruth A., 6048 Paseo Canyon Drive, Malibu, California 90265, (US)
LEGAL REPRESENTATIVE:
Kuhnen, Wacker & Partner (100051), Schneggstrasse 3-5 Postfach 1553, W-8050 Freising, (DE)
PATENT (CC, No, Kind, Date): EP 422468 A2 910417 (Basic)
EP 422468 A3 920415
APPLICATION (CC, No, Date): EP 90118740 900928;
PRIORITY (CC, No, Date): US 419308 891010
DESIGNATED STATES: DE; ES; FR; GB; IT; NL
INTERNATIONAL PATENT CLASS: G02F-001/35; H01S-003/23;
ABSTRACT WORD COUNT: 164

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	1734
SPEC A	(English)	EPABF1	5366
Total word count - document A			7100
Total word count - document B			0
Total word count - documents A + B			7100

Self-pumped, optical phase conjugation **method and apparatus using pseudo-conjugator to** produce **retroreflected seed** beam .

...CLAIMS back into the respective media in coherent coupled relation with each other.
26. An optical **phase conjugation** apparatus, comprising:
a first non-linear optical medium;
a second non-linear optical medium;
pseudo...

...conjugate beams in the first medium constituting reference beams; and
means for directing an optical **probe beam** into the first medium at an angle relative to the reference beams predetermined to generate a **phase conjugate** reflected beam through interaction of the **probe beam** with the reference beams.
27. An optical **phase conjugation** apparatus, comprising:
a first non-linear optical medium;
a second non-linear optical medium;
pseudo the first medium constituting reference beams; and
means for directing a plurality of optical **probe beams** into the first medium at angles relative to the reference beams predetermined to generate respective **phase conjugate** reflected beams which are coherently coupled with each other through interaction of the **probe beams** with the reference beams.
28. An apparatus as in claim 27, in which the probe beams are non-parallel to each other.
29. An optical **phase conjugation** apparatus, comprising:
a plurality of first non-linear optical media;
a second non-linear optical...
...conjugate beam in each first medium constituting reference beams; and
means for directing an optical **probe beam** into each respective first medium at an angle relative to the reference beams predetermined to generate a **phase conjugate** reflected beam through interaction of the **probe beam** with the reference beams.
30. A method of self-pumped phase conjugation of an optical...

...pumped conjugate beams in the first medium constituting reference beams; and
(c) directing an optical **probe beam** into the first medium at an angle relative to the reference beams predetermined to generate a

phase conjugate reflected beam through interaction of the **probe beam** with the reference beams.

38. A method of optical phase conjugation, comprising the steps of...

...beams in the first medium constituting reference beams; and

(c) directing a plurality of optical **probe beams** into the first medium at angles relative to the reference beams predetermined to generate respective **phase conjugate** reflected beams which are coherently coupled with each other through interaction of the **probe beams** with the reference beams.

39. A method of optical phase conjugation, comprising the steps of...

...pumped conjugate beams in each first medium constituting reference beams; and

(d) directing an optical **probe beam** into each of the respective first media at an angle relative to the reference beams predetermined to generate a **phase conjugate** reflected beam through interaction of the **probe beam** with the reference beams. ...

12/3,K/13 (Item 13 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

00413915

Phase conjugate laser with a temporal square pulse.

Phasenkonjugierter Laser mit zeitlichem Rechteckpuls.

Laser a phase conjuguee avec une impulsion temporelle carree.

PATENT ASSIGNEE:
Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066, Los Angeles, California 90045-0066, (US), (applicant designated states: BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)

INVENTOR:
Gregor, Eduard, 820 Las Lomas Avenue, Pacific Palisades, California 90272, (US)
Muir, Alexander R., 8110 Redlands Arm Street No. 109, Playa Del Rey, California 90293, (US)
Sorce, James S., 4633 Compton Boulevard, No. 148, Lawndale, California 90260, (US)

LEGAL REPRESENTATIVE:
Kuhnen, Wacker & Partner (100051), Schneggstrasse 3-5 Postfach 1553, D-8050 Freising, (DE)

PATENT (CC, No, Kind, Date): EP 405195 A2 910102 (Basic)
EP 405195 A3 911227
APPLICATION (CC, No, Date): EP 90110713 900606;
PRIORITY (CC, No, Date): US 372503 890628
DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: H01S-003/23; H01S-003/10;
ABSTRACT WORD COUNT: 308

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS A	(English)	EPABF1	995
SPEC A	(English)	EPABF1	1721
Total word count - document A			2716
Total word count - document B			0
Total word count - documents A + B			2716

...ABSTRACT A2

A system and method for **producing** relatively square **laser** pulses derived from relatively Gaussian laser pulses. The system (10) comprises a **phase conjugate** laser system that comprises a laser oscillator (11), an amplifying medium (15) and a **phase conjugate** mirror (18) having a nonlinear medium confined at a predetermined pressure. The mirror (18) is...

...that has a gas confined therein at a predetermined pressure. The plasma switch (12) and **phase conjugate** mirror (18) cooperate to truncate the **laser** pulse to **produce** a **laser** pulse having a relatively square shape. Controlling the pressures in the plasma switch (12) and **phase conjugate** mirror (18) provides a means of controlling the formation of square-shaped laser pulses. In...

...15) to amplify the laser pulse. The amplified laser pulse is then reflected from a **phase conjugate** mirror (18). The pressure in the **phase conjugate** mirror (18) is adjusted to a predetermined pressure to truncate the front portion of the **laser** pulse, thus **producing** a relatively square output pulse. Additionally, the relative length of a delay line (16) disposed...

...CLAIMS amplifying path and adapted to rotate the polarization of an applied laser pulse.
2. A **phase conjugate** laser comprising:
a laser oscillator;
a **phase conjugate** mirror having a nonlinear medium therein confined at a predetermined pressure that is adapted to...

...of an applied laser pulse;
an amplifying medium disposed between the laser oscillator and the **phase conjugate** mirror for amplifying an applied laser pulse;
a plasma switch disposed between the laser oscillator...

...at a predetermined pressure that is adapted to truncate a predetermined rear portion of the **laser** pulse to **produce** a **laser** pulse having a relatively square shape.
3. A **phase conjugate** laser comprising:
a laser oscillator;
a **phase conjugate** mirror having a nonlinear medium therein confined at a predetermined pressure that is adapted to...

...of an applied laser pulse;
an amplifying medium disposed between the laser oscillator and the **phase conjugate** mirror for amplifying an applied laser pulse;
a plasma switch disposed between the laser oscillator...

...therein at a predetermined pressure that is adapted to truncate the rear portion of the **laser** pulse to **produce** a **laser** pulse having a relatively square shape;
wherein the relative pressures employed in the **phase conjugate** mirror and plasma switch are determinative of the truncation of the laser pulse transmitted from the oscillator to the **phase conjugate** mirror and back, and which **produces** the **laser** pulse having a relatively square shape.
4. A method of forming a square laser pulse...

12/3,K/14 (Item 14 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00381487
OPTICAL DEVICE USING STIMULATED BRILLOUIN SCATTERING.
STIMULIERTE BRILLOUIN-STREUUNG AUSNUTZENDE OPTISCHE VORRICHTUNG.
DISPOSITIF OPTIQUE UTILISANT LA DIFFUSION BRILLOUIN STIMULEE.
PATENT ASSIGNEE:
Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066, Los Angeles, California 90045-0066, (US), (applicant designated states: BE;CH;DE;FR;GB;IT;LI;NL;SE)
INVENTOR:
ROCKWELL, David, A., 1356 Sunset Avenue, Santa Monica, CA 90405, (US)
MANGIR, Metin, S., 536 Sixteenth Street, Santa Monica, CA 90402, (US)

WHITE, Jeffrey, O., 3615 Rambla Pacifico Street, Malibu, CA 90265, (US)
JONES, Dennis, C., 8809 Reading Avenue, Westchester, CA 90045, (US)
LEGAL REPRESENTATIVE:
KUHNEN, WACKER & PARTNER (100051), Alois-Steinecker-Strasse 22 Postfach 1553, D-85315 Freising, (DE)
PATENT (CC, No, Kind, Date): EP 339085 A1 891102 (Basic)
EP 339085 B1 930818
WO 8904009 890505
APPLICATION (CC, No, Date): EP 89900692 880906; WO 88US3082 880906
PRIORITY (CC, No, Date): US 111941 871021
DESIGNATED STATES: BE; CH; DE; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G02F-001/35;
ABSTRACT WORD COUNT: 154
NOTE:
No A-document published by EPO

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	1170
CLAIMS B	(German)	EPBBF1	1073
CLAIMS B	(French)	EPBBF1	1313
SPEC B	(English)	EPBBF1	3920
Total word count - document A			0
Total word count - document B			7476
Total word count - documents A + B			7476

...CLAIMS said gain medium (2; 16; 22) by modifying the SBS steady state gain coefficient of **the gain** medium during the **application** of said **higher** optical intensity **to decrease** the SBS gain coefficient and thereby increase the fidelity of the output beam (E(sub...
...having a stimulated Brillouin scattering (SBS) gain coefficient g determining the strength of coupling between **an input** optical beam (E(sub(P))) and said gain **medium** (2; **16** ; 22), **comprising**

a) means for directing said input optical beam (E(sub(P))) having a first optical intensity...

...during the application of said first optical intensity;
b) means for increasing the optical intensity **of** the input **optical beam** (E(sub(P))) to a higher optical intensity, whereby SRS is dominated by SBS when...

12/3,K/15 (Item 15 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00341830
Broadband optical detection of transient motion from a scattering surface.
Breitbandige optische Erfassung der transienten Bewegung einer streuenden Oberflache.
Detection optique a large bande du mouvement transitoire d'une surface dispersive.
PATENT ASSIGNEE:
NATIONAL RESEARCH COUNCIL OF CANADA, (487620), , Ottawa Ontario K1A OR6, (CA), (applicant designated states: AT;BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)
INVENTOR:
Monchalin, Jean-Pierre, 3840 Wilson, Montreal Quebec H4A 2T8, (CA)
LEGAL REPRESENTATIVE:
Casalonga, Axel et al (14511), BUREAU D.A. CASALONGA - JOSSE Morassistrasse 8, W-8000 Munchen 5, (DE)
PATENT (CC, No, Kind, Date): EP 339625 A1 891102 (Basic)
EP 339625 B1 930203

APPLICATION (CC, No, Date): EP 89107608 890427;
PRIORITY (CC, No, Date): CA 565550 880429
DESIGNATED STATES: AT; BE; CH; DE; ES; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G01N-029/00; G01B-009/02;
ABSTRACT WORD COUNT: 194

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	3534
CLAIMS B	(German)	EPBBF1	2056
CLAIMS B	(French)	EPBBF1	2623
SPEC B	(English)	EPBBF1	6046
Total word count - document A			0
Total word count - document B			14259
Total word count - documents A + B			14259

...CLAIMS reference beam, and for combining said reflected beam portion with said reference beam to cause **interference thereof** and **thereby** provide said **optical signal** .
26. An apparatus according to claim 25, further including a polarizing beam splitter (218) optically...

...to claim 16, wherein said sideband stripping means comprises a partially transmitting mirror and two **phase - conjugating** mirrors each made of a material having a slow refractive index phase grating formation following light interference, said partially transmitting mirror and said first and second **phase - conjugating** mirror being arranged relative to one another such that said first **phase - conjugating** mirror reflects said second scattered beam portion onto said partially transmitting mirror which in turn reflects same onto said second **phase - conjugating** mirror to obtain a reflected sideband-free beam portion defining said reference beam.
30. An...

12/3,K/16 (Item 16 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00319613
Coherent beam formation.
Bildung eines koharenten Bundels.
Etablissement d'un faisceau coherent.
PATENT ASSIGNEE:
GENERAL ELECTRIC COMPANY, (203903), 1 River Road, Schenectady, NY 12345, (US), (applicant designated states: DE;FR;NL)
INVENTOR:
O'Donnell, Matthew, 2009 Lexington Parkway, Schenectady New York 12309, (US)
Flax, Stephen Wayne, 7829 West Wisconsin Avenue, Wauwatosa Wisconsin 53213, (US)
LEGAL REPRESENTATIVE:
Pratt, Richard Wilson et al (46454), London Patent Operation G.E. Technical Services Co. Inc. Essex House 12/13 Essex Street, London WC2R 3AA, (GB)
PATENT (CC, No, Kind, Date): EP 320303 A2 890614 (Basic)
EP 320303 A3 891011
EP 320303 B1 931027
APPLICATION (CC, No, Date): EP 88311716 881209;
PRIORITY (CC, No, Date): US 132079 871211
DESIGNATED STATES: DE; FR; NL
INTERNATIONAL PATENT CLASS: G10K-011/34;
ABSTRACT WORD COUNT: 224

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	2564
CLAIMS B	(German)	EPBBF1	1351
CLAIMS B	(French)	EPBBF1	1828
SPEC B	(English)	EPBBF1	5553
Total word count - document A			0
Total word count - document B			11296
Total word count - documents A + B			11296

...ABSTRACT A2
A method for iterative **phase conjugation** adaptive reduction of phase aberration effects upon the time delays necessary for formation of a...

...from a large collection of scatterers, contained in a portion of the medium to be **investigated** , a **probe beam** for that **beam** angle (theta). The received signals from each of the (N-1) pairs of adjacent transducers are cross-correlated to derive a like number of **phase conjugation** correction signals, which are then arithmetically operated upon to provide a time correction for the time delay associated with each **probe beam** transducer, for that range R and angle (theta). The time correction for each transducer then...

...iterations, with each excitation made with the most recent corrected delays values, better focuses the **interrogating beam** , until, after a selected number of iterations, actual imaging data can be obtained with minimal...

...CLAIMS a probe beam originating from the plurality N of transducers;
(b) cross-correlating, for each **probe beam** , the received signals from a k-th one, where 1<=k<=N, of the transducers...

...of adjacent ones of all N transducers to produce a like number (N-1) of **phase conjugation** correction signals (DELTA)(phi)(sub(k));
(c) arithmetically operating upon the plurality of **phase conjugation** correction signals (DELTA)(phi)(sub(k)) to produce a time correction (DELTA)t(sub(j(theta))) for the time delay associated with that one **probe beam** at an angle (theta) and transducer j for that range R;
(d) then modifying by...

...to the j-th ones of the (DELTA)(phi)(sub(k)) terms to provide the **phase conjugation** correction signal (phi)(sub(j(theta))) for the j-th transducer of the **probe beam** .
9. The method of claim 6, wherein for each transducer 1 through (N-1), step...and for converting energy reflected thereto to a signal therefrom, comprising:
means for causing a **probe beam** from each different and sequential one of a selected set of **probe beams** to reflect from scatterers naturally contained in at least a portion of the media to be investigated and be received by substantially all transducers of the array;
phase conjugation processing means for cross-correlating, for each **probe beam** , the received signals from each k-th one, where 1<=k<=N, of the (N-1) successive pairs of adjacent transducers to produce a like number of **phase conjugation** correction signals (DELTA)(phi)(sub(k));
means for arithmetically operating upon the plurality of **phase conjugation** signals (DELTA)(phi)(sub(k)) to produce a time correction (DELTA)t(sub(j(theta...

...and focused substantially to range R;
means for causing at least one additional iteration of **probe**

beam irradiation, reflection reception and processing to further modify the time corrections of at least one...

...the j-th ones of the (DELTA)(phi)(sub(k)) data signals to provide the **phase conjugation** correction signal (phi)(sub(j(theta))) for the j-th transducer last providing a **probe beam** at angle (theta).

19. The apparatus of claim 15, wherein each processing means further includes...

...to the j-th ones of the (DELTA)(phi)(sub(k)) terms to provide the **phase conjugation** correction signal (phi)(sub(j(theta))) for the j-th transducer of the **probe beam** .

9. The method of claim 6, wherein for each transducer 1 through (N-1), step...

...and for converting energy reflected thereto to a signal therefrom, comprising

means for causing a **probe beam** from each different and sequential one of a selected set of **probe beams** to reflect from scatterers naturally contained in at least a portion of the media to ...

...be received by substantially all transducers of the array; and characterized in that it comprises

phase conjugation processing means for cross-correlating, for each **probe beam** , the received signals from each k-th one, where 1<=k<=N, of the (N-1) successive pairs of adjacent transducers to produce a like number of **phase conjugation** correction signals (DELTA)(phi)(sub(k));

means for arithmetically operating upon the plurality of **phase conjugation** signals (DELTA)(phi)(sub(k)) to produce a time correction (DELTA)t(sub(j(theta...

...and focused substantially to range R;

means for causing at least one additional iteration of **probe beam** irradiation, reflection reception and processing to further modify the time corrections of at least one...

...the j-th ones of the (DELTA)(phi)(sub(k)) data signals to provide the **phase conjugation** correction signal (phi)(sub(j(theta))) for the j-th transducer last providing a **probe beam** at angle (theta).

19. The apparatus of claim 15, wherein each processing means further includes...

12/3,K/17 (Item 17 from file: 348)

DIALOG(R)File 348:EUROPEAN PATENTS

00278696

SELF-PUMPED PHASE CONJUGATE MIRROR.

SELBSTGEPUMPTER PHASENKONJUGIERTER SPIEGEL.

MIROIR A CONJUGAISON DE PHASE A AUTO-POMPAGE.

PATENT ASSIGNEE:

Hughes Aircraft Company, (214913), 7200 Hughes Terrace P.O. Box 45066, Los Angeles, California 90045-0066, (US), (applicant designated states: BE;CH;DE;FR;GB;IT;LI;NL;SE)

INVENTOR:

VALLEY, George, C., 2827 Wigtown Road, Los Angeles, CA 90064, (US)

KLEIN, Marvin, B., 2955 Valmere Drive, Malibu, CA 90265, (US)

LEGAL REPRESENTATIVE:

Kuhnen, Wacker & Partner (100051), Schneggstrasse 3-5 Postfach 1553, W-8050 Freising, (DE)

PATENT (CC, No, Kind, Date): EP 259374 A1 880316 (Basic)
EP 259374 B1 910904
WO 8705406 870911

APPLICATION (CC, No, Date): EP 87901192 870127; WO 87US114 870127
PRIORITY (CC, No, Date): US 836679 860305
DESIGNATED STATES: BE; CH; DE; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G02F-001/35;
NOTE:
No A-document published by EPO
LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	718
CLAIMS B	(German)	EPBBF1	694
CLAIMS B	(French)	EPBBF1	798
SPEC B	(English)	EPBBF1	3136
Total word count - document A			0
Total word count - document B			5346
Total word count - documents A + B			5346

...CLAIMS B1

1. A self-pumped **phase conjugate** mirror (PCM), comprising:
a crystal (18) formed from a photorefractive material and adapted to receive an optical **probe beam** (20); **beam** deflection means (26, 28) adapted to deflect an output beam (24) as a return beam (30) through said crystal (18) at a return angle (A) to the **probe beam** (20) within the crystal (18) which is sufficiently small to induce a **phase conjugate** (32) of said **probe beam** (20); characterized by
means (14, 16, 8) for applying an alternating electric field to said...

...said intensity pattern and photorefractive index grating resulting from the interference of said deflected return **beam** (30) and said **probe beam** (20) within said crystal, wherein said shift between said intensity pattern and said photorefractive index...

...photorefractive material having an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation** .

2. The self-pumped PCM of claim 1, said photo refractive material having an electro...

...less than the index grating formation time of the crystal material.

7. A self-pumped **phase conjugate** mirror (PCM), comprising a body (18) formed from a photorefractive material and adapted to receive an optical **probe beam** (20);
external **beam** deflection means (26, 28) adapted to deflect said **probe beam** (20) which has been transmitted through said body (18) at a predetermined return angle to the **probe beam** (20) back through the body (18) to induce a **phase conjugate** (32) of the **probe beam** (20); characterized by further comprising
means (8, 14, 16) for applying an alternating electric field...

...photorefractive material has an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation** and in that said **phase conjugate** of the **probe beam** (20) is induced without external pump beams

8. The self-pumped PCM of claim 7...

...the body (18) of less than about 5(degree).

10. A method of forming a **phase conjugate** of a **probe** optical **beam** (20), comprising:
directing the beam through a photorefractive crystal (18) in a first direction;
directing...

...a suffiently small angle to the first direction within the crystal (18) to induce a **phase conjugate** of said **probe** optical **beam** (20);
characterized by the further steps of
applying an alternating electric field across the crystal...

...said intensity pattern and photorefractive index grating resulting from the interference of said deflected return **beam** (30) and said **probe beam** (20) within said crystal, wherein said shift between said intensity pattern and said photorefractive index...
...photorefractive material has an electro-optic coefficient not high enough to inherently sustain self-pumped **phase conjugation** .
11. The method of claim 10, the probe optical beam (20) comprising a continuous wave...

12/3,K/18 (Item 18 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00273343
An apparatus for optically analyzing an object using four-wave mixing technique.
Gerat zur optischen Analyse eines Gegenstandes unter Verwendung der Vierwellen-Mischungstechnik.
Appareil d'analyse optique d'un objet utilisant la technique de melange de quatre ondes.
PATENT ASSIGNEE:
HAMAMATSU PHOTONICS K.K., (631420), 1126-1 Ichino-cho Hamamatsu-shi, Shizuoka-ken, (JP), (applicant designated states: DE;GB)
INVENTOR:
Aoshima, Shinichiro, c/o Hamamatsu Photonics K.K. No. 1126-1 Ichino-cho, Hamamatsu-shi Shizuoka, (JP)
Tsuchiya, Yutaka, c/o Hamamatsu Photonics K.K. No. 1126-1 Ichino-cho, Hamamatsu-shi Shizuoka, (JP)
LEGAL REPRESENTATIVE:
Rackham, Stephen Neil et al (35061), GILL JENNINGS & EVERY, Broadgate House, 7 Eldon Street, London EC2M 7LH, (GB)
PATENT (CC, No, Kind, Date): EP 271339 A2 880615 (Basic)
EP 271339 A3 890607
EP 271339 B1 940316
APPLICATION (CC, No, Date): EP 87310862 871210;
PRIORITY (CC, No, Date): JP 86293538 861211; JP 86302912 861219
DESIGNATED STATES: DE; GB
INTERNATIONAL PATENT CLASS: G03H-001/00; G02F-001/35;
ABSTRACT WORD COUNT: 174

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	522
CLAIMS B	(German)	EPBBF1	484
CLAIMS B	(French)	EPBBF1	537
SPEC B	(English)	EPBBF1	6875
Total word count - document A			0
Total word count - document B			8418
Total word count - documents A + B			8418

...ABSTRACT path to the reference beam I, II. The object beam III interferes with the reference **beam** I, II to **produce** a **phase conjugate** which is returned along the path of the object beam. A beam splitter (9) directs the **phase conjugate** beam onto an image observation device (10). ...

...CLAIMS a diffusely reflecting object (15) using a four wave mixing technique, the apparatus comprising:
a **laser** source (1) for producing a **pulsed laser beam** ;
a non-linear optical element (12) for **producing** a **phase conjugate wave** in accordance with a beam incident on it;
a first beam splitting means (2) for...

...7) for guiding the object beam (III);
a third guide means (9) for projecting the **phase conjugate** object **wave from** the non-linear optical element (12) onto image observing means (10); characterised in that the second **guide means** (7) include beam expanding means for illuminating the object, and a focusing lens (11) for...

12/3,K/19 (Item 19 from file: 348)
DIALOG(R)File 348:EUROPEAN PATENTS

00247380
Phase conjugate reflecting media.
Phasenkonjugierte reflektierende Medien.
Milieux reflechissants a conjugaison de phase.
PATENT ASSIGNEE:
The British Petroleum Company p.l.c., (203080), Britannic House Moor Lane , London EC2Y 9BU, (GB), (applicant designated states: BE;CH;DE;ES;FR;GB;IT;LI;NL;SE)
INVENTOR:
Connors, Lucy Margaret, The British Petroleum Company p.l.c. Chertsey Road, Sunbury-on-Thames Middlesex, TW16 7LN, (GB)
Drury, Marion Rosemary, The British Petroleum Company p.l.c. Chertsey Road, Sunbury-on-Thames Middlesex, TW16 7LN, (GB)
LEGAL REPRESENTATIVE:
Krishnan, Suryanarayana Kalyana et al (52001), c/o The British Petroleum Company plc Patents Division Chertsey Road, Sunbury-on-Thames Middlesex TW16 7LN, (GB)
PATENT (CC, No, Kind, Date): EP 243130 A1 871028 (Basic)
EP 243130 B1 910612
APPLICATION (CC, No, Date): EP 87303437 870416;
PRIORITY (CC, No, Date): GB 8610027 860424
DESIGNATED STATES: BE; CH; DE; ES; FR; GB; IT; LI; NL; SE
INTERNATIONAL PATENT CLASS: G02F-001/35; G03H-001/04; C08F-138/02
ABSTRACT WORD COUNT: 76

LANGUAGE (Publication,Procedural,Application): English; English; English
FULLTEXT AVAILABILITY:

Available Text	Language	Update	Word Count
CLAIMS B	(English)	EPBBF1	326
CLAIMS B	(German)	EPBBF1	268
CLAIMS B	(French)	EPBBF1	354
SPEC B	(English)	EPBBF1	2472
Total word count - document A			0
Total word count - document B			3420
Total word count - documents A + B			3420

...CLAIMS beams having a wavelength in the infra-red region of the electromagnetic spectrum.
8. A **phase conjugate** mirror when used in a device according to any one of the preceding claims 3-7 wherein said device has means for **producing** at least two **laser** beams and one other beam which are incident upon the optical medium, thereby giving rise...

12/3,K/20 (Item 1 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00916836 **Image available**
HIGH POWER LASER SYSTEM WITH FIBER AMPLIFIERS AND LOOP PCM
SYSTEME LASER EXTREMEMENT PUISSANT COMPORTANT DES AMPLIFICATEURS DE FIBRES ET UN MIROIR A CONJUGAISON DE PHASE EN BOUCLE

Patent Applicant/Assignee:
HRL LABORATORIES LLC, 3011 Malibu Canyon Road, Malibu, CA 90265-4799, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
BETIN Alexander, 1246 8th Street, Manhattan Beach, CA 90266, US, US (Residence), RU (Nationality), (Designated only for: US)
Legal Representative:
BERG Richard P (et al) (agent), Ladas & Parry, 5670 Wilshire Boulevard, Suite 2100, Los Angeles, CA 90036-5679, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200250965 A2 20020627 (WO 0250965)
Application: WO 2001US42003 20010904 (PCT/WO US0142003)
Priority Application: US 2000659389 20000911
Parent Application/Grant:
Related by Continuation to: US 2000659389 20000911 (CON)
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PH PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 3257

Fulltext Availability:
Claims

Claim
... a first beam multiplexer connected to receive the input laser beam from said coupler to **produce** a plurality of **beams** , a plurality of fiber amplifiers to receive respectively said plurality of beams and amplify said...

...beams to combine said amplified plurality of beams into a resultant amplified beam, and
a **phase conjugate** mirror arrangement, including a further fiber amplifier, said **phase conjugate** mirror arrangement having an input receiving said resultant amplified beam, said **phase conjugate** mirror arrangement providing a loop path for said resultant amplified beam in which said resultant amplified beam is further amplified and **phase conjugated** with said resultant amplified beam received at the input of said **phase conjugate** mirror arrangement thereby eliminating any phase and polarization distortions and aberrations occurring in said fiber amplifiers,
said **phase conjugate** mirror arrangement producing an output beam which is supplied in reverse direction through said second...

...method as claimed in claim 8, wherein said single resultant amplified beam supplied to said **phase conjugate** mirror arrangement passes through a non-linear cell to an amplifier which produces an amplified...

...said amplified output signal from said amplifier back to said non-linear cell whereat a **phase conjugated beam** is **produced** which passes in reverse direction in said loop for output therefrom as said output beam from said **phase conjugate** mirror arrangement.

12/3,K/21 (Item 2 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00914576 **Image available**
MULTIPLEX COHERENT RAMAN SPECTROSCOPY DETECTOR AND METHOD
DETECTEUR ET PROCEDE DE SPECTROSCOPIE MULTIPLE COHERENTE DE RAMAN
Patent Applicant/Assignee:
SPELMAN COLLEGE, 350 Spelman Lane, S.W., Atlanta, GA 30314-4399, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
CHEN Peter, 1203 Haven Brook Way, Atlanta, GA 30319, US, US (Residence), US (Nationality), (Designated only for: US)
JOYNER Candace C, 398 Anvil Way, Austell, GA 30168, US, US (Residence), US (Nationality), (Designated only for: US)
PATRICK Sheena T, 6331 Monterrey Creek Drive, Durham, NC 27713, US, US (Residence), US (Nationality), (Designated only for: US)
GUYER Dean R, 1272 NE 30th Street, Bellevue, WA 98005-1605, US, US (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
BEHRINGER John W (agent), Fitzpatrick, Cella, Harper & Scinto, 30 Rockefeller Plaza, New York, NY 10112-3801, US,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200248660 A1 20020620 (WO 0248660)
Application: WO 2001US45852 20011213 (PCT/WO US0145852)
Priority Application: US 2000254926 20001213
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CO CR CU CZ DE DK DM DZ EC EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZM ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GQ GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZM ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 16106

Fulltext Availability:
Claims

Claim
... The apparatus defined by Claim 1, further comprising:
a driving device configured and positioned to **produce** a driving **beam** directed to said broadband coherent beam generator to cause the production of the broadband coherent...
...driving device
comprises a Raman cell filled with a gas and generating a backward-propagating, **phase - conjugate** beam of Raman radiation comprising the driving beam in response to receiving the first narrowband ...

12/3,K/22 (Item 3 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT
(c) 2002 WIPO/Univentio. All rts. reserv.

00824619 **Image available**
MICROPHONE ARRAYS FOR HIGH RESOLUTION SOUND FIELD RECORDING
RESEAU DE MICROPHONES POUR ENREGISTREMENT DE CHAMP SONORE A RESOLUTION ELEVEE
Patent Applicant/Assignee:
INDUSTRIAL RESEARCH LIMITED, Gracefield Road, Lower Hutt, Wellington, NZ, NZ (Residence), NZ (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:

POLETTI Mark Alistair, Flat 2, 20 Invercargill Drive, Kelson, Lower Hutt, Wellington, NZ, NZ (Residence), NZ (Nationality), (Designated only for: US)
Legal Representative:
CALHOUN Douglas C (et al) (agent), A J Park, 6th Floor, Huddart Parker Building, Post Office Square, P.O. Box 949, Wellington 6015, NZ,
Patent and Priority Information (Country, Number, Date):
Patent: WO 200158209 A1 20010809 (WO 0158209)
Application: WO 2001NZ10 20010202 (PCT/WO NZ0100010)
Priority Application: NZ 502603 20000202
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY BZ CA CH CN CR CU CZ DE DK DM DZ EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK LR LS LT LU LV MA MD MG MK MN MW MX MZ NO NZ PL PT RO RU SD SE SG SI SK SL TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE TR
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW MZ SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 7864

Fulltext Availability:
Claims

Claim
... line of microphones with either equal or different inter-microphone 1 5 separations, and use **beam** forming principles to **produce** one or more **beams** with sharp directivity in one or more directions. Surround sound systems offer the potential for...6)
2 2
The second term consists of a negative frequency complex plane wave with **conjugate** **phase** and the same positive wavenumber ko propagating in the opposite direction 00 + /r . The spectrum...

12/3,K/23 (Item 4 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00758994 **Image available**
BI-DIRECTIONAL SHORT PULSE RING LASER
LASER BIDIRECTIONNEL EN ANNEAU A IMPULSION BREVE
Patent Applicant/Assignee:
UNIVERSITY OF NEW MEXICO, Patent Administration Office, Hokona Hall, Zuni Wing, Room 357, Albuquerque, NM 87131, US, US (Residence), US (Nationality), (For all designated states except: US)
Patent Applicant/Inventor:
BOHN Matthew J, Patent Administration Office, Hokona Hall, Zuni Wing, Room 357, Albuquerque, NM 87131, US, US (Residence), US (Nationality)
DIELS Jean-Claude M, 13517 Sunset Canyon, Northeast, Albuquerque, NM 87108, US, US (Residence), US (Nationality), (Designated only for: US)
DANG Thien Trang, 401 Sycamore Street, Northeast, Albuquerque, NM 87106, US, US (Residence), US (Nationality), (Designated only for: US)
JONES R Jason, 211 Montclaire, Northeast, Albuquerque, NM 87108, US, US (Residence), US (Nationality), (Designated only for: US)
Legal Representative:
MAYS Andrea L, Peacock, Myers & Adams, P.O. Box 26927, Albuquerque, NM 87125-6927, US
Patent and Priority Information (Country, Number, Date):
Patent: WO 200072411 A1 20001130 (WO 0072411)
Application: WO 2000US11516 20000428 (PCT/WO US0011516)
Priority Application: US 99131843 19990430
Designated States: AE AG AL AM AT AU AZ BA BB BG BR BY CA CH CN CR CU CZ DE DK DM EE ES FI GB GD GE GH GM HR HU ID IL IN IS JP KE KG KP KR KZ LC LK

LR LS LT LU LV MA MD MG MK MN MW MX NO NZ PL PT RO RU SD SE SG SI SK SL
TJ TM TR TT TZ UA UG US UZ VN YU ZA ZW
(EP) AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE
(OA) BF BJ CF CG CI CM GA GN GW ML MR NE SN TD TG
(AP) GH GM KE LS MW SD SL SZ TZ UG ZW
(EA) AM AZ BY KG KZ MD RU TJ TM
Publication Language: English
Filing Language: English
Fulltext Word Count: 13091

English Abstract
...laser produces bi-directional light pulses that interact in such a way that they are **phase conjugated** . A nonlinear substance, such as a nonlinear crystal (4) or fluid (CS/2), that has...

...refraction that is dependent upon light intensity is located near a beam waist of the **laser** cavity to **produce** a self-lensing effect. Methods for reducing dead band beyond observable limits are also provided...

12/3,K/24 (Item 5 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00188688
METHOD AND APPARATUS FOR ENERGY TRANSFERS BETWEEN OPTICAL BEAMS USING NEAR-BANDGAP ELECTROREFRACTIVE EFFECT
PROCEDE ET APPAREIL DE TRANSFERTS D'ENERGIE ENTRE DES FAISCEAUX OPTIQUES UTILISANT L'EFFET ELECTROREFRACTIF D'INTERBANDE
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
VALLEY George C,
KLEIN Marvin B,
PARTOVI Afshin,
KOST Alan,
GARMIRE Elsa M,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9106032 A1 19910502
Application: WO 90US5593 19901001 (PCT/WO US9005593)
Priority Application: US 89480 19891013
Designated States: AT BE CH DE DK ES FR GB IT JP LU NL SE
Publication Language: English
Fulltext Word Count: 5586
Fulltext Availability:
Claims

Claim
... between the beams,

22 The system of claim 21, said PR material com
prising a **phase conjugating** medium, wherein said **beams** are arranged to **produce** a **phase conjugate** of one of the beams from said medium.

23 The system of claim 22, implemented...

12/3,K/25 (Item 6 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00183853
COUPLING MECHANISM FOR EFFICIENT CONVERSION OF AXISYMMETRIC BEAM PROFILES INTO PROFILES SUITABLE FOR DIFFRACTION-FREE TRANSMISSION IN FREE SPACE

MECANISME DE COUPLAGE POUR LA CONVERSION EFFICACE DE PROFILS DE RAYONS AXISYMETRIQUES EN PROFILS APPROPRIES POUR UNE TRANSMISSION SANS DIFFRACTION DANS UN ESPACE LIBRE

Patent Applicant/Assignee:
STEWART Bob W,
Inventor(s):
STEWART Bob W,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9101193 A2 19910207
Application: WO 90US4009 19900717 (PCT/WO US9004009)
Priority Application: US 89890 19890718
Designated States: AT AT AU BB BE BF BG BJ BR CA CF CG CH CH CM DE DE DK DK ES ES FI FR GA GB GB HU IT JP KP KR LK LU LU MC MG ML MR MW NL NL NO RO SD SE SE SN SU TD TG
Publication Language: English
Fulltext Word Count: 3046

Fulltext Availability:
Claims

Claim
... third optical path;
optics disposed along said third optical path for collimating said amplified pc **beam** , **produc** ing the J @profiled beam;
phase conjugation means disposed at ter mination of the first and second optical paths and at the...

...profiled light;
optics disposed along said second optical path for the purpose of forming a **probe beam** and backward pump beam from the higher intensity segment and to focus said beams into...

...third optical path;
optics disposed along said third optical path for collimating said amplified pc **beam** , **produc** ing the JO@profiled beam;
phase conjugation means disposed at ter mination of the first and second optical paths and at the beginning of the third optical path for encoding the **probe beam** with the transverse intensity profile of the forward pump beam,
o Apparatus comprising:
oscillator means...along the first optical path for receiving the encoded coherent light, substantially amplifying it, and **phase conjugating** it;
optics disposed along the first optical path in order to redirect the pc beam...

...profiled light;
optics disposed along said second optical path for the purpose of forming a **probe beam** and forward pump beam from the higher intensity segment and to focus said beams into...third optical path;
optics disposed along said third optical path for collimating said amplified pc **beam** , **produc** ing the Jo-profiled beam;
phase conjugation means disposed at ter mination of the first and second optical paths and at the beginning of the third optical path for encoding the **probe beam** with the transverse intensity profile of the backward pump beam. -1 g
6e Apparatus comprising...

12/3,K/26 (Item 7 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00177423
BANDWIDTH-PRESERVING BRILLOUIN PHASE CONJUGATE MIRROR AND METHOD
PROCEDE ET MIROIR A PHASES CONJUGUEES DE BRILLOUIN A CONSERVATION DE LA BANDE PASSANTE
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
ROCKWELL David A,
LIND Richard C,
PEPPER David M,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9010889 A1 19900920
Application: WO 90US914 19900222 (PCT/WO US9000914)
Priority Application: US 89649 19890315
Designated States: AT BE CH DE DK ES FR GB IT JP LU NL SE
Publication Language: English
Fulltext Word Count: 6574

English Abstract
...laser (82) is fed into a Brillouin-enhanced four wave mixer (88) which generates a **phase conjugated** seed beam in counterpropagation with the input beam. A Brillouin amplifier (86) is provided between...

...from the input beam (Ep) to the seed beam (Ec) and thereby amplify the seed **beam** to **produce** a **phase conjugated** output beam with approximately 50 % of the energy of the input beam and narrow bandwidth ...

...associated with the acoustic noise generally required to initiate and sustain stimulated Brillouin scattering. The **phase conjugated** output beam can be modulated or steered in direction, as desired. Reference beams for the...

12/3,K/27 (Item 8 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00176793
REAL-TIME DYNAMIC HOLOGRAPHIC IMAGE STORAGE DEVICE
DISPOSITIF DE STOCKAGE DYNAMIQUE EN TEMPS REEL D'IMAGES HOLOGRAPHIQUES
Patent Applicant/Assignee:
THE UNITED STATES GOVERNMENT as represented by THE NATIONAL AERONAUTICS AND SPACE ADMINISTRATION,
Inventor(s):
LAFLEUR Sharon S,
MONTGOMERY Raymond C,
Patent and Priority Information (Country, Number, Date):
Patent: WO 9010258 A1 19900907
Application: WO 90US971 19900302 (PCT/WO US9000971)
Priority Application: US 89217 19890302
Designated States: AT AU BE CA CH DE DK ES FR GB IT JP KR LU NL SE
Publication Language: English
Fulltext Word Count: 4282

Fulltext Availability:
Claims

Claim

... a first dynamic interference pattern
between the object beam and the first set of reference
beams to **produce** a **phase - conjugate** object beam;
(c) creating a dynamic interference pattern between
io the **phase - conjugate** object beam and the second set of
reference **beams** to **produce** a reconstructed object **beam** ;
and
(d) directing the reconstructed object beam into the
first dynamic interference pattern to enable...

...reference beams and the object
2o beam initially, the reconstructed object beam
subsequently, and the **phase - conjugate** object beam,
respectively.
3* A method as recited in claim 2. wherein the at
least...

...e) comprises adjusting an angular
relationship between at least one of the reconstructed
5 and **phase - conjugate** object beams and the first and second
sets of reference beams, respectively.
8e A method...
...recited in step 11 further
comprising the step of processing at least one of the
phase - conjugate object beam and the reconstructed object
beam.

9 An apparatus for storing a holographic image...

...a first dynamic
interference pattern between the object beam and the
first set of reference **beams** to **produce** a **phase - conjugate**
object beam;
second pattern means for creating a second dynamic
20 interference pattern between the **phase - conjugate** object
beam and the second set of reference **beams** to **produce** a
reconstructed object **beam** ; and
directing means for directing the reconstructed
object beam into the first dynamic interference pattern...

12/3,K/28 (Item 9 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00157640
OPTICAL DEVICE USING STIMULATED BRILLOUIN SCATTERING
DISPOSITIF OPTIQUE UTILISANT LA DIFFUSION BRILLOUIN STIMULEE
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
ROCKWELL David A,
MANGIR Metin S,
WHITE Jeffrey O,
JONES Dennis C,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8904009 A1 19890505
Application: WO 88US3082 19880906 (PCT/WO US8803082)
Priority Application: US 87941 19871021
Designated States: BE CH DE FR GB IT JP KR NL NO SE
Publication Language: English
Fulltext Word Count: 5912

Fulltext Availability:
Claims

Claim
... a
phase conju Ate mirror (PCM) which o erates upon an input
9 P
optical **beam** to **produce** a **phase** **conjugate** output beam, the
fidelity of the output beam to the input beam decreasing
with increasing...

...a gain medium whose stimulated
Brillouin scattering (SBS) gain coefficient is sufficient
ly low to **produce** an output **beam** whose f idelity to the
input beam is at least equal to a desired amount...

12/3,K/29 (Item 10 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00140846
SYSTEM AND METHOD FOR ENCODING INFORMATION ONTO AN OPTICAL BEAM
SYSTEME ET PROCEDE SERVANT A CODER DES INFORMATIONS SUR UN FAISCEAU OPTIQUE
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
PEPPER David M,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8705715 A1 19870924
Application: WO 87US292 19870212 (PCT/WO US8700292)
Priority Application: US 86344 19860321
Designated States: BE CH DE FR GB IT JP KR NL NO SE
Publication Language: English
Fulltext Word Count: 6301

Fulltext Availability:
Claims

Claim
... alternating
field frequency for the first PCM, and means for sensing
frequency differences between the **phase** **conjugated** output
beams of the two PCMs to detect the modulation applied to
alternating field for...

...medium between the mirror and PCM,, the mirror,, PCM and
- 21
gain medium comprising a **phase** **conjugate** laser, wherein
the modulating means is adapted to modulate the electric
field within the PCM...the transfer of energy from the first to the
second beam,
22* A self-pumped **phase** **conjugate** mirror (PCM),
comprising:
a crystal formed from a photorefractive material
adapted to receive a first...

...a return angle to the f irst beam path within the
body at which a **phase** **conjugated** output **beam** is **produced** ,
and
means for modulating the alternating electric
field to encode information onto the output beam...

...at least one second optical beam to the
body to cross-couple with the first **beam** and **produce** a
...returning the first beam through the body at a return
angle to the f irst **beam** to **produce** an output **beam** as a
phase **conjugate** of the first beam, thereby providing

self-pumped conjugate reflection of the first beam. - 24...

12/3,K/30 (Item 11 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00140537
SELF-PUMPED PHASE CONJUGATE MIRROR
MIROIR A CONJUGAISON DE PHASE A AUTO-POMPAGE
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
VALLEY George C,
KLEIN Marvin B,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8705406 A1 19870911
Application: WO 87US114 19870127 (PCT/WO US8700114)
Priority Application: US 86679 19860305
Designated States: BE CH DE FR GB IT JP KR NL NO SE
Publication Language: English
Fulltext Word Count: 3858

Fulltext Availability:
Claims

English Abstract
A self-pumped **phase conjugate** mirror and method in which an optical beam (20) is applied to a crystal (18...

...back into the crystal as a return beam (30) to cross-couple with the input **probe beam** (20) and an alternating electric field is applied across the crystal to establish a photorefractive...

...shift of about 90degrees and bring the crystal gain up to a level at which **phase conjugation** takes place. By a suitable selection of field strength and frequency, and an angle between the **probe** and return **beams** within the crystal of less than about 5degrees (3degrees for GaAs), semiconductor materials with electro...

Claim
la A self-pumped **phase conjugate** mirror (PCM),
comprising:
a crystal formed from a photorefractive material
and adapted to receive an optical **probe beam** ,
means for applying an alternating electric field
to the crystal of sufficient magnitude and frequency...

...shift of about
901 within the crystal, and
beam deflection means adapted to deflect a **probe**
beam back through the crystal at a return angle to the
probe beam within the crystal which is sufficiently small
to induce a **phase conjugate** of the **probe beam** . 2a. The
self-pumped PCM 'of claim 1, said photo
refractive material having an electro...

...deflection means deflecting the -return beam back through
the crystal at an angle to the **probe beam** within the
crystal of less than about 50,
So The self-pumped PCM of claim...
...but less than the grating formation
time of the crystal material.
7e A self-pumped **phase conjugate** mirror (PCM),
comprising:

a body formed from a photorefractive material
and adapted to receive an optical **probe** **beam** ,
means for establishing a photorefractive index
grating shift of about 901 within the body, and...

...which has been transmitted through the PCM body at a
predetermined return angle to the **probe** **beam** back through
the body to induce a **phase** **conjugate** of the **probe** **beam** . So The
@self-opumped PCM of claim 7, said photorefractive material comprising a
semiconductor.
9...

...for directing the return
beam back through the photorefractive material at an angle
to the **probe** **beam** within the body of less than about 5'.

10 A method of forming a **phase** **conjugate** of a **probe**
optical **beam** , comprisirig:
directing the beam through a photorefractive
crystal in a first direction,
establishing a photorefractive...

...at a sufficiently small angle to
the first direction within the crystal to induce a **phase**
conjugate of the input beam.
11o, The method of claim 10, the **probe** optical **beam**
. I
comprising a continuous wave laser beam.
12* The method of claim 10, said photorefractive...

12/3,K/31 (Item 12 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00137645
ASSOCIATIVE HOLOGRAPHIC MEMORY APPARATUS EMPLOYING PHASE CONJUGATE MIRRORS
DISPOSITIF DE MEMOIRE A HOLOGRAPHIE ASSOCIATIVE UTILISANT DES MIROIRS A CONJUGAISON DE PHASES
Patent Applicant/Assignee:
HUGHES AIRCRAFT COMPANY,
Inventor(s):
MAROM Emanuel,
SOFFER Bernard H,
OWECHKO Yuri,
DUNNING Gilmore J,
PEPPER David M,
KLEIN Marvin B,
LIND Richard C,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8702505 A2 19870423
Application: WO 86US2033 19860926 (PCT/WO US8602033)
Priority Application: US 85884 19851011
Designated States: CH DE FR GB IT JP NL SE
Publication Language: English
Fulltext Word Count: 4670
Fulltext Availability:
Claims

Claim
... stored-image-associated reference
beam and where the hologram has the properties of
providing a **probe** -reference **beam** in response to a
probe image being incident thereon and, in a
reciprocal manner, prdviding the probe image in

response to the **probe** -reference **beam** being incident thereon;
a first **phase conjugate** mirror;
first light path means for conveying the **probe** reference **beam** provided by the hologram to the first **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated probe** reference **beam** generated by the first **phase conjugate** mirror;
a second phase congugate mirror;
second light path means for conveying the probe image provided by the hologram to the second **phase conjugate** mirror and for conveying back to the hologram a phase congugated probe image generated by the second **phase conjugate** mirror;
third light path means for conveying the input image to the hologram as a probe image; and
fourth light path means for conveying the **phase conjugated** probe image generated by the second **phase conjugate** mirror to an output image viewing 30@ plane.

2 The apparatus of Claim 1 in which the first **phase conjugate** mirror further includes threshold means for conveying back'to the hologram a **phase conjugate** of only those components of the **probe** reference **beam** which exceed a predetermined threshold level of beam intensitys
3e The apparatus of Claim 2 in which the first light path means includes means for focusing the **probe** reference **beam** provided by the hologram onto the first **phase conjugate** mirror.

4 The apparatus of Claim 2 in.which the first **phase conjugate** mirror is a **phase conjugate** mirror with amplification which provides a **phase conjugate probe** reference **beam** having a greater amplitude than the corresponding **probe** reference **beam** .

5 The apparatus of Claim 4 in which the amount of amplification is sufficient to...stored-image-associated reference
beam and where the hologram has the properties of providing a **probe** reference **beam** in response to a probe image being incident thereon and, in a 10- reciprocal manner, of providing the probe image in response to the **probe** reference **beam** being incident thereon;
a **phase conjugate** mirror;
first light path means for conveying the **probe** reference **beam** provided by the hologram to the **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated probe** reference **beam** generated by the **phase conjugate** mirror;
second light path means for conveying the probe image provided by the hologram to the **phase conjugate** mirror and for conveying back to the hologram a **phase conjugated** probe image generated by the **phase conjugate** mirror;
third light path means for conveying the input image to the hologram as a probe image; and
fourth light path means for conveying the **phase conjugated** probe image generated by the **phase conjugate** mirror to an output image viewing plane.

10 The apparatus of Claim 9 in which the **phase conjugate** mirror further includes threshold means for conveying back to the hologram a **phase conjugate** of only those components of the **probe** reference **beam** which exceed a predetermined threshold level of beam intensity.
The apparatus of Claim 10 in which the first light path means includes means for focusing the **probe** reference **beam** provided by the hologram onto the **phase conjugate** mirror.

12 The apparatus of Claim 10 in which the **phase conjugate** mirror is a **phase conjugate** mirror with amplification which provides a **phase conjugated probe** reference **beam** having a greater amplitude than the corresponding **probe** reference **beam** .

13 The apparatus of Claim 12 in which the amount of amplification 'is sufficient to...

12/3,K/32 (Item 13 from file: 349)
DIALOG(R)File 349:PCT FULLTEXT

00120115
DEGENERATE FOUR-WAVE MIXER USING MULTIPLE QUANTUM WELL STRUCTURES
MELANGEUR DEGENERE DE QUATRE ONDES UTILISANT DES STRUCTURES DE PUITS DE QUANTA MULTIPLES
Patent Applicant/Assignee:
AMERICAN TELEPHONE & TELEGRAPH COMPANY,
Inventor(s):
CHEMLA Daniel Simon,
MILLER David Andrew Barclay,
SMITH Peter William,
Patent and Priority Information (Country, Number, Date):
Patent: WO 8403364 A1 19840830
Application: WO 84US250 19840223 (PCT/WO US8400250)
Priority Application: US 83319 19830228
Designated States: DE FR GB JP NL
Publication Language: English
Fulltext Word Count: 15075

Fulltext Availability:
Claims
English Abstract
...substantially overlaps said first beam of light within said MQW structure. At least one output **phase conjugate beam** of light is **produced** by interaction of said first and said second beams of light with said multiple quantum well structure. An alternate embodiment has two counterpropagating pump **beams** and a **probe beam** of light which **produce** a backward scattered **phase conjugate** beam of light.

Claim
... and the multiple layer heterostructure being on a single substrate,

30 Method of generating a **phase conjugate** light beam,
CHARACTERIZED BY
a) providing ...pump beam of light so that it propagates through the MQW structure;
c) directing a **probe beam** of light so that it
yfffzv@
0

- 45
propagates through the MQW and substantially overlaps...
...light within the MQW structure so that a
first output beam of light which is **phase conjugate** to the
probe beam of light is generated within the MQW and
propagates away from the MQW.

31 Method...

...pump beam of light and
substantially overlaps the first pump beam of light and
the **probe beam** of light within the MQW structurer so that
the first pump beam, the second pump **beam** and the **probe**
beam interact with the MQW structure and produce at least
one second output beam of light which is **phase conjugate** to
the **probe beam** of light and which propagates away from the
MQWO
Wipo
I @ T. A four-wave...

...first beam of light (550) within the MQW structure so
that at least one output **phase conjugate** beam of light
(560) is produced by interaction of the first (550) and the
second...material has a mimimum bandgap value of 0.73eV.
4 8. Method of generating a **phase conjugate** light
beam, comprising
a) providing a multiple quantum well (MQW)
structure as a nonlinear optical...

...beam of light so that
it propagates through the MQW Structurer and
c) directing a **probe beam** of light so that it
propagates through the MQWr
CHARACTERIZED BY
the **probe beam** of light is directed to
substantially overlap the first pump beam of light within
the...

...of light is
generated within the MQW and propagates away from the MQW
which is **phase conjugate** to the **probe beam** of light.

33 Method according to claim 30,
CHARACTERIZED BY
directing a second pump beam...
...pump beam of light and
substantially overlaps the first pump beam of light and
the **probe beam** of light within the MQW structure, so that
the first pump beam, the second pump **beam** and the **probe**
beam interact with the MQW structure and produce at least
one second output beam of light which is **phase conjugate** to
25 the **probe beam** of light and which propagates away from the
MQW6
rX
NA